2.2 DIVISION OF FOREST AND BIOMATERIALS SCIENCE

1. Outline of the Division

Forests play a very important role in the environment of the earth and provide wood resources that are continuously renewable in contrast with fossil resources such as petroleum and coal. Research and educational activities of this division cover not only preservation, cultivation, and continuous production of forest resources, but also utilization of forest products for our life and culture with the aim of coexistence of forest and human beings.

This division consists of 20 laboratories, including 2 laboratories of Field Science Education and Research Center and 5 laboratories of Research Institute for Sustainable Humanosphere (renamed Wood Research Institute reconstructed in April, 2005), and their activities are international and interdisciplinary.

2. Number of students

There are 91 students (42 freshmen and 49 2nd year students) in the Master's program and 67 students in the doctor's program of this division.

3. Divisions and laboratories offering lectures

Division of Forest and Biomaterials Science: Laboratories of Forest Resources and Society, Forest Environment Planning, Tropical Forest Resources and Environments, Forest Utilization, Forest Biology, Landscape Architecture, Erosion Control, Biomaterials Design, Wood Processing, Biofibrous Materials, Tree Cell Biology, Composite Materials Chemistry, and Chemistry of Biomaterials.

Field Science Education and Research Center:

Laboratories of Forest Information, and Silviculture.

Research Institute for Sustainable Humanosphere:

Laboratories of Active Bio-based Materials, Sustainable Materials, Structural Function, Innovative Humano-habitability, Biomass Morphologenesis and Information

4. Event in 2005

The orientation course for freshmen on April, 16 at Kamigamo Experimental Station offered a curriculum-guidance. After the orientation, a short Station-tour and subsequent welcome party were carried out.

Chair of Forest Resource Management

2.2.1 Laboratory of Forest Resources and Society

Staff Professor : Iwai,Yoshiya,Dr.Agric.Sci.

Students and research fellows

Doctor's program : (4)

Master's program: (8)

Undergraduate : (3)

A. Reseach Activities (2005.4-2006.3)

A-1. Main subjects

a) World forestry and global forest resources management

The topics include forest, forestry and forest industry in the world, and correlation between developed and developing countries through wood trade.The new forestry with fast growing species is analysed.

b) Recreational and environmental uses of forests

Research is on the meanings of recreational activities and the environmental meanings of forest from the view point of socio-economic and cultural side.

c) Production and uses of forest products

The topics include wood, non-wood products and bamboo from the view point of socio-economic, cultural and historical side.

A-2. Publications and presentations

a) Publications

Original papers

Iwai,Y.:Changes and problems for bamboo and bamboo shoot productions,case study in Kagoshima prefecture. Applied Forest Science,Vol.14 No.1.; 1-8,2005(in Japanese)

Saito, H.: Gathering activities of wild edible plants and mushrooms conducted by city dwellers: Analysises of its background and characteristics from questionnaire surveys of mountaineering club members in Iwate and Kyoto prefecture. Forest Economics No.58 Issue7; 1-16, 2005 (in Japanese)

Reports

Iwai,Y.:Use and resources of bamboo and wood,Bamboo No.92.; 3-4, 2005 (in Japanese)

Iwai,Y.:Changes and problems of bamboo production area,especially Kyusyu,Journal of the 46th bamboo congress in Japan; 11-20, 2005 (in Japanese)

Iwai,Y.:Development of Kitayama forestry,Report for preservation and activation planning of cultural scenery; 32-47, 2006 (in Japanese)

Iwai,Y.:Silviculture method of Kitayama-sugi and the today's meaning of Kitayama-sugi stump, Report for preservation and activation planning of cultural scenery; 69-77, 2006 (in Japanese)

Saito, H.: An Ethnographical Essay on Wild Edible Plants Gathering. Chiri No.50 Issue7; 56-60,

2005 (in Japanese)

Saito, H.: Woodland Classification and Use of Edible Plants and Mushrooms. Annual report of Project 4-2, Reserch Institute for Humanity and Nature; 392-395, 2005 (in Japanese)

Saito, H.: Basic data on Mushroom Use in Xythani District, Laos; Toward an Eco-historical Study. Annual report of Project 4-2, Reserch Institute for Humanity and Nature; 396-401, 2005 (in Japanese)

Ikeguchi, A., Saito, H., Adachi, Y., Nonaka, K. and Nishimura Y.: Marketplace networks and distribution of natural resources in Vientiane City and Xaythani District, Laos. Annual report of Project 4-2, Reserch Institute for Humanity and Nature; 359-369, 2005 (in Japanese)

Saito, H. and Mitsumata, G.: Consideration of the Sustainable Interaction between Human and Environment: Focus on the Change of Gathering Practice of Matsutake in Ayabe, Kyoto. Report of the workshop for commons and eco-history; 24-41, 2005 (in Japanese)

Mitsumata, G. and Saito, H.: An Essay on Coexistence between Economy and Environment: A Case Study of Communal Management of Hot Springs in Japan. Report of the Workshop for Commons and Eco-history: 167-183, 2005 (in Japanese)

b) Conference and seminar papers presented

The 56h Annual Meeting of the Japanese Forestry Society,Kansai Branch (2)

The 2005 meeting of Association of American Geographers (1)

Autumn Congress of the Association of Japanese Geographers (1)

B. Educational Activities (2005.4-2006.3)

B-1. On-campus teaching

a) Courses given

Undergraduate Level: Science of Biosphere-Life,Food and Environment- (Iwai), Outline of Agricultural Science II (Iwai), Forest and Biomaterial Science IV(Iwai), World Forest Resources (Iwai), Graduation Thesis (Iwai)

Graduate level: Forest Resources and Society(Iwai),Seminar in Forest Resources and Society (Iwai), Laboratory Course in Forest Resources and Society (Iwai)

C. Other remarks

Iwai, Y.: Commiteeman of Forest Policy in Osaka Prefecture,Commiteeman of Agriculture,Forest and Fishery in Hyogo Prefecture,Commiteeman of Forest Policy in Kyoto Prefecture, Commiteeman of Agriculture, Forestry and Fishery in Osaka Prefecture, Commiteeman of Public Works Evaluation in Shiga Prefecture.Commiteeman of Old Capital Scenery in Nara Prefecture,Consultant of Community Forest Management in Kyoto Prefecture, Commiteeman of National Forest Management in Kinki and Chugoku Area

Iwai, Y.: Invited presentation for The 46th bamboo congress in Japan,2005

2.2.2 Laboratory of Tropical Forest Resources and Environments

Staff *Professor* : *Ohta, Seiich, D. Agric. Sci.*
Ass. Professor : *Kanzaki, Mamoru, D. Sci.*
Assistant Professor : *Kaneko, Takayuki*
Students and research fellows
Doctor's program : *(11)*
Master's program : *(9)*
Undergraduate : *(4)*
Research student : *(1)*

A. Research Activities (2005.4-2006.3)

A-1. Main subjects

a) Elements cycling and sustainable management of industrial tree plantations in the tropics

To evaluate and predict the sustainability of industrial plantation rapidly expanding in the devastated land in the tropics, and to present the measures to solve the related problems, the researches have been initiated on budget of nutrient elements and GHEG in soil-plant systems of industrial tree plantation of leguminous species and also on the mechanism of their fluctuation with forestry practices.

b) Soil ecology and forest distribution in the area of tropical seasonal forests

To elucidate and predict the influence of forest change in the Mekong basin on hydrological cycling in the area, the researches are in progress to demonstrate the soil physical characteristics as mechanical composition, pore distribution and hydraulic conductivity, and structure, species composition and leaf area index of forests for major soil-forest combinations which are extracted by analyzing the distributions pattern of soil and vegetation in the area.

c) Carbon sequestration function of tropical seasonal forests and its fluctuation

For the quantitative evaluation of the carbon sequestration function of forest, members of the laboratory are studying at a tropical seasonal evergreen forest of Thailand, with special reference to coarse woody debris (CWD) and long-term forest dynamics.

d) Maintenance and regeneration mechanism of tropical forests

For elucidating the maintenance and natural regeneration mechanisms of tropical forests, dynamics of seedlings and saplings and insect-plant interactions of several forest types are being studied. Furthermore, various disturbances to forests, such as fire and slash-and-burn activity of human beings in the areas of rainforest, seasonal forests and montane forests in Asian tropics are also being studied.

A-2. Publications and presentations

a) Publications

Books

Kanzaki, M. Changing Tropical Forest. Forest Environment 2006. pp.66-73. Forest Culture Association. 2006 (Co-auther, in Japanese)

Kanzaki, M. Long-term Ecological Research Sites in Japan. Forest Ecology: Perspectives from the long-term large-scale studies. Bun-Ichi Sogo Shuppan. (Co-auther, in Japanese)

Original papers

Kurashima, T., and Jamroenprucksa, M.,: Policy and Politics Related to Thai Occupied Forest Areas in the 1990s -Democratization and Persistent Confrontation-. Southeast Asian Studies 43 (1): 76-97. 2005

Naito, Y., Konuma, A., Iwata, H., Suyama, Y., Seiwa, K., Okuda, T., Lee, S. L., Norwati, M., and Tsumura, Y.: Selfing and inbreeding depression in seeds and seedling of *Neobalanocarpus heimii* (Dipterocarpaceae). Journal of Plant Research 118: 423-430. 2005

Imaya, S. Ohta, N. Tanaka and Y. Inagaki 2005: General chemical properties of Brown Forest Soils developed from different parent materials in submontane zone of the Kanto and Chubu district, Japan, Soil Sci. Plant Nutr.: 51 (6), 873-884. 2005

Hosaka,T., H. Watanabe, and B. H. Saharjo.: The abundance and composition of arboreal arthropods in Acacia mangium and Paraserianthes falcataria plantations in South Sumatra, Indonesia. Tropics 14: 255-261. 2005

Takagi,S., T. Hosaka, and T. Okuda.: Materials of dipterocarp-associated gall-inhabiting cocoids collected in Negeri Sembilan, Malaya (Homoptera: Coccoidea). Insecta matsumurana new series 62: 123-151. 2005

Report etc.

Fukushima M. Dynamics of secondary forest after the cessation of shifting cultivation and the utilization of forest by Karen in Doi Inthanon National Park, Northern Thailand. Proceedings of the International Symposium "Eco-human Interaction in Tropical Forests" p.29. 2005

Wakita C. Land-use change and the distribution of a pioneer tree, Schima wallichii in South Sumatra, Indonesia. Proceedings of the International Symposium "Eco-human Interaction in Tropical Forests" p.50. 2005

Sasaki, A., Kanzaki, M., Takeda, S. and Preechapanya, P. Changes in Subsistence and Socio-economic Factors in Villages Produsing Miang (Chewing Tea) in Northern Thailand. Proceedings of the 7th Kyoto University International Symposium "Coexistence with Nature in a 'Glocalizing' World -Field Science Perspectives-" 197-206. 2005

Akihiro Tani, Eriko Ito, Mamoru Kanzaki, Seiichi Ohta, Khorn Saret, Pith Phearak, Tith Bora, Pol Sopheavuth, and Lim Sopheap. Principal forest types of three regions of Cambodia: Kompong Thom, Kratie, and Mondolkiri, Proceedings of International Conference on Forest Environment in Continental River Basins; with a focus on the Mekong River. Pp.65-66. 2005

Saret, K., E. Ito, L. Sopheap, P. Spheavuth, T. Bora, P. Phearak, A. Tani, M. Kanzaki, S. Ohta, T. Kaneko, Y. Okuda, M. Araki. Leaf area index (LAI) comparison of two dipterocarp forest types in the right side of Mekong River, Cambodia. Proceedings of International Conference on Forest Environment in Continental River Basins; with a focus on the Mekong River. Pp.67-69. 2005

Kanzaki M. R. Hiramatsu, J. Toriyama, T. Kaneko, Y. Okuda, S. Ohta, K.Saret, P. Phearak, L. Sopheap, P. Sopheavuth, E. Ito, M. Araki. Isolated stand of Melaleuca and sparse forest patches in an evergreen forest zone of Kompong Thom, Cambodia: A transect study along micro-topography gradient. Proceedings of International Conference on Forest Environment in Continental River Basins; with a focus on the Mekong River. Pp.69-70. 2005

Ito, E., L. Sopheap, P. Sopheavuth, T. Bora, P. Phearak, K. Saret, A. Tani, M. Kanzaki, S. Ohta, T. Kaneko, Y. Okuda, M. Araki. Use of ASTER spectral vegetation index to estimate special variations of tropical seasonal forests in the west bank of Mekong, Cambodia. Proceedings of International Conference on Forest Environment in Continental River Basins; with a focus on the Mekong River. Pp.71-72. 2005

Araki M, Toriyama J, Shimizu A, Ito E, Kabeya N, Nobuhiro T, Lim S, Pol S, Tith B, Khorn S, Pith P, Det S, Ohta S, Kanzaki M. Changes of vertical soil moisture of a dry evergreen forest in Kompong Thom, Cambodia. Proceedings of International Conference on Forest Environment in Continental River Basins; with a focus on the Mekong River. Pp.29-30. 2005

Toriyama J, Ohta S, Araki M, Kanzaki M, Khorn S, Pith P, Lim S, Pol S. Soils under different forest types in dry evergreen forest zone in the province of Kompong Thom, Cambodia: Classification, Morphology and physicochemical properties. Proceedings of International Conference on Forest Environment in Continental River Basins; with a focus on the Mekong River. Pp.73-74. 2005

Araki1 M, Toriyama J, Ohta S, Kanzaki M, Ito E, Lim S, Pol S, Tith B, Khorn S, Pith P, Det S. Soil moisture conditions at four types of forests in Kompong Thom, Cambodia. Proceedings of International Conference on Forest Environment in Continental River Basins; with a focus on the Mekong River. Pp.75-76. 2005

Ohnuki Y, Kimhean C, Shinomiya Y, Sor S, Toriyama J, Ohta S, Arak M. Superficial change of soil depth and soil hardness at forested area in Kampong Thom Province, Cambodia. Proceedings of International Conference on Forest Environment in Continental River Basins; with a focus on the Mekong River. Pp.79-80. 2005

Shinomiya Y , Araki M, Toriyama J, Ohnuki Y, Shimizu A, Kabeya N, Nobuhiro T, Kimhean C, So S. Effect of soil water content on water storage capacity: Comparison between the forested areas in Cambodia and Japan. Proceedings of International Conference on Forest Environment in Continental River Basins; with a focus on the Mekong River. Pp.81-82. 2005

Kanzaki, M. Study in the tropics. Bulletin of Kansai Organization for Nature Conservation 27(1):69-74. 2005

b) Conference and seminar papers presented

The 53rd Ann. Meeting of Ecological Society of Japan (2)

A-3. Off-campus activities

Membership in academic societies (roles)

Ohta, S.: The Japanese Forestry Society (Council member), Japanese Society of Forest Environment (Council member), Editorial board of The Pedorogist (Editor)

Kanzaki, M.: The Japanese Association of Tropical Ecology (Council member, Secretary), The Society of Vegetation Science (Editor), Kansai Organization of Nature Conservation (Council member)

Research grants

Ohta, S.: JSPS research grant: Kiban-kenkyu A -2; Clarification and prediction of soil acidification under leguminous fast-growing tree plantation in humid tropic. (Rep. Ohta), JSPS research grant: Kiban-kenkyu B -2; Elucidation of the mechanism of the changes in

species composition and the prediction of Carbon sink function of tropical forests under the effect of fire. (Ohta, Rep. Y. Kiyono), Research Revolution 2002; Model Development for the Predication of Water Resources Changes due to Natural Variation and Human Modification in the Asia Monsoon Region. (3) The study on processes related to hydrological cycling and model development. (Ohta, Rep.: K. Takeuchi), Co-research Grant of Ministry of Environment; Study of Terrestrial Ecosystem of Asia for the Carbon Management of 21st Century. (Ohta, Rep.: Tani)

Kanzaki, M.: JSPS research grant: Kiban-kenkyu B-2; Ecological resouece utilization and the household strategies of minor ethnic groups of Myanmar: Perspective to the regional comparison. (Kanzaki, Rep.: Y. Hayami), JSPS research grant: Kiban-kenkyu B-2;Elucidation of the mechanism of the changes in species composition and the prediction of Carbon sink function of tropical forests under the effect of fire. (Kanzaki, Rep. Y. Kiyono), A; Ecological study of gregarious flowering of Melocannna baccifera in Mizoram, India. (Kanzaki, Rep.:S. Shibata), Co-research Grant of Ministry of Environment; Study of Terrestrial Ecosystem of Asia for the Carbon Management of 21st Century. (Kanzaki, Rep.: Tani), Research Revolution 2002; Model Development for the Predication of Water Resources Changes due to Natural Variation and Human Modification in the Asia Monsoon Region. (3) The study on processes related to hydrological cycling and model development (Kanzaki, Rep.: K. Takeuchi)

Kaneko, T.: JSPS research grant: Kiban-kenkyu A -2; Clarification and prediction of soil acidification under leguminous fast-growing tree plantation in humid tropic. (Kaneko, Rep. S. Ohta)

A-4. International cooperation and overseas activities

International meetings

Fukushima M. and Wakita C.: International Symposium “Eco-human Interaction in Tropical Forests”, Kyoto University. (Aural and poster sessions)

Kanzaki M.: International Symposium “Eco-human Interaction in Tropical Forests”, Kyoto University. (Chair)

Sasaki A.: the 7th Kyoto University International Symposium “Coexistence with Nature in a ‘Glocalizing’ World -Field Science Perspectives-” (Poster session)

Kanzaki M.: The 7th Kyoto University International Symposium “Coexistence with Nature in a ‘Glocalizing’ World -Field Science Perspectives-” (Session moderator)

Toriyama J., Tani A.: International Conference on Forest Environment in Continental River Basins; with a focus on the Mekong River (Aural session)

Kanzaki M.: International Conference on Forest Environment in Continental River Basins; with a focus on the Mekong River (Aural session, Chair, Invited speaker)

International joint researches, overseas research surveys

Ohta, S.: Study on clarifying the soil acidification under leguminous fast-growing tree plantation in humid tropic (Indonesia), Short-term expert for Japan International Cooperation Agency Project of Forest management for carbon sequestration in Indonesia. (Indonesia), Survey for the study on processes related to hydrological cycling and model development (Cambodia, Thailand), Survey for the Project of technical development for promoting CDM tree plantation (Indonesia)

Kanzaki, M.: The study on processes related to hydrological cycling and model development (Cambodia, Thailand), Study of Ecological restoration of tropical montane forest based on traditional local knowledge of hill tribes (Thailand), Stuty of Elucidation of the mechanism of the changes in species composition and the prediction of Carbon sink function of tropical forests under the effect of fire (Indonesia), Study of bamboo flowering (India)

Kaneko, T.: Study on clarifying the soil acidification under leguminous fast-growing tree plantation in humid tropic (Indonesia)

B. Educational Activities (2005.4-2006.3)

B-1. On-campus teaching

a) Courses given

Undergraduate level: Forest Science I (Ohta), Tropical Forest Environment (Ohta), Tropical Forest Resources (Kanzaki), Practice in Environmental Science (Ohta, Kanzaki), Laboratory Course in Biological and Environmental Science I (Kanzaki, Kaneko), Laboratory Course in Forest and Biomaterials Biology (Kanzak, Kaneko), Laboratory Course in Ecology (Kanzaki, Kaneko), Practice in University Forest I (Kanzaki, Kaneko). Practice in University Forest IV (Kaneko). KUINEP (Ohta, Kanzaki), Environmental Studies A (Kanzaki), Forest Environmental Science (Kanzaki)

Graduate level: Tropical Forest Environment (Ohta), Seminar in Tropical Forest Resources and Environments (Ohta, Kanzaki), Practice in Tropical Forest Environments (Ohta, Kanzaki)

B-2. Off-campus teaching, etc.

Part-time Lectures

Ohta, S.: Natural Functional Biology (Faculty of Science: Osaka City University)

Kanzaki, M.: Practice in Environmental Biology I (Faculty of Science: Osaka Women's University)

Open Lectures

Ohta, S.: Open Lecture of Kyoto University "What is the sustainability" (Lecturer), NPO Senior Nature University: Global Environmental Ecosystem Science (Lecturer)

Kaneko, T.: Open Lecture of Kyoto University "What is the sustainability" (Field training)

Kanzaki, M.: NPO Senior Nature University: Global Environmental Ecosystem Science (Lecturer)

B-3. Overseas teaching

Students and research fellows from abroad

Research Student 1 (Myanmar)

C. Other remarks

Ohta, S.: UFJ Research Institute, the issues of forest carbon sink (Working group member); Japanese Center for Environment and Health, Acid Deposition and Oxidants Research Center, Soil and vegetation monitoring (Analyzing group member), Interior data verification group (Committee member), Working group for soil and vegetation (Committee member), Supporting group for soil and vegetation task force (Committee member), Group for methodological development of catchment analysis (Committee

member); JIFPRO, Project of technical development for promotion of CDM tree plantation (Committee member); Ministry of Environment, Project of counter-measure for acid deposition (Committee member); Japanese Center for Overseas Plantation Promotion, Project of environmental impacts of artificial forest in developing countries (Committee member); Japan Forestry Technology Association, Project of system development for identification of carbon sink forests (Committee member); Forestry Agency, Monitoring of acid deposition and forest decline (Committee member); Japan Society for the Promotion of Science, funding for science research (Technical committee member).

2.2.3 Laboratory of Forest Environment Planning

Staff *Professor* *: Ohta, Seiichi, Dr. Agric. Sci.*
Associate Professor : Matsushita, Koji, Dr. Agric. Sci.

A. Reseach Activities (2005.4-2006.3)

A-1. Main subjects

a) Forest planning system

Social demands for forest resources are multiple and changing. The most recent change is the increase of forest management problems related to global warming. To solve these current problems, we are conducting research to change the forest planning system and forest survey methods to include a broader range of public benefits.

b) Laws relating to forest management

The development of legal systems is necessary for forest management because the forest resources are connected to various public benefits. In our laboratory, the following laws relating to the forest are being examined: Forest Law, Basic Forest and Forestry Law, National Forest Management Law, Law to Promote the Modernization of the Rights for the Common Forest.

c) Sustainable forest tourism

The national forest has a protective forest system. The area of protective forest and the surroundings also have importance from the point of tourism. Protection forest for scenic beauty and recreational use are contributing to tourism. We conduct research on how to develop sustainable forest tourism.

A-2. Publications and presentations

a) Publications

Original papers

Matsushita, K.: Cutting activities and conservation of beech forests in Shirakami mountain range, *Nogyo to Keizai* **71(6);** 21-29, 2005

A-3. Off-campus activities

Membership in academic societies (roles)

Matsushita, K.: Kansai Branch of the Japanese Forest Society (Editor), Common Forest Society of Middle Japan (Council, Secretary General, Executive Committee of 26th Annual Meeting), Center for Environment Information Science (Reviewer)

B. Educational Activities (2005.4-2006.3)

B-1. On-campus teaching

a) Courses given

Undergraduate Level: Exercises in Information Processing Basics (Matsushita), Introduction to Forest Environment (Matsushita), Food and Environment under Economic Development and Globalization (Matsushita), Laboratory Course in Forest and Biomaterials Science IV (Matsushita), Laboratory Course in Applied Forest and Biomaterial Science (Matsushita), Forest Planning (Matsushita), Forest Tourism (Matsushita)

Graduate level: Forest Management (Matsushita)

b) Part-time Lectures

Matsushita, K.: Faculty of Agriculture, Kyoto Prefectural University (Forest Policy I, Forest Policy II), Graduate School of Agriculture, Kyoto Prefectural University (Special Lecture of Forest Management Planning III)

C. Other remarks

Matsushita, K.: Member of the advisory body to Shiga Prefecture on forest and forestry (till November, 2005); Member of the management board of Shiga Prefectural Biwako Afforestation Corporation; Policy consultant of Nara Prefecture on the promotion of the effective utilization of common forests; Member of the advisory body of Kyoto Prefectural Forestry Workers Support Center; Member of the exploratory committee on Kyoto Prefectural Afforestation Corporation; Member of the management board of Takatsuki Municipal Corporation for Urban Greening and Forest Management (till May, 2005)

Chair of Forest and Forestry Production

2.2.4 Laboratory of Forest Utilization

Staff *Professor* *:Nobuchi, Tadashi, Dr. Agric. Sci.*
Associate Professor:Okada, Naoki, Dr. Agric. Sci.
Instructor *:Hasegawa, Hisashi, Dr. Agric. Sci.*

Students and research fellows
Doctor's program: (2)
Master's program: (7)
Undergraduate : (5)

A. Research Activities (2005.4-2006.3)

A-1. Main activities

a) Improvement of plantation grown trees aiming at the production of high quality timbers

For establishing the silvicultural technique of broad-leaved trees, how the planting density affects the tree growth and tree shape in keyaki (*Zelkova serrata*) plantations was investigated. The results indicated that site condition has more influence on tree growth than planting density. Although high planting density promoted the natural pruning, thinning and pruning is still needed to produce good quality timber of keyaki.

b) Characterization of wood formation and water relations in tropical trees

Wood anatomical characteristics of Dipterocarpaceae and other trees in tropical seasonal forests of Thailand was investigated to reveal how growing conditions affect the wood formation. Vessel diameter and vessel frequency generally showed a negative correlation. In a single stem, vessel diameter tended to decrease with increasing stem hight, whereas vessel frequency tended to increase. Water relations of the trees growing in dry dipterocarp forests with a distinct dry season was investigated based on phonological observation and stable isotope analysis. The reslults showed the trees are coexisting with sharing the water resources by means of different rooting depth, leaf habit (deciduous/evergreen) and different transpiration rate.

c) Vessel formation and phenology of broad-leaved trees

The timing of vessel formation and leaf flush was compared for 10 broad-leaved tree species. As a result, there was conspicuous difference between ring-porous and difuse-porous species. In ring-porous species, lignification of the first vessels in the trunk and the branches completed almost as same as leaf flush. On the other hand in diffuse-porous species, lignification of the first vessels in the branches completed just after leaf flush, and in the trunk one month after. Maximum photosynthetic rate of ring-porous species was greater than that of diffuse porous species. The leaf flush in ring-porous species was later than that in the difuse-porous species. However, the former species form large-diameter vessels, which enable the species efficiently to transport water, and hence to photosynthesize.

d) Effect of seasonal change of forests on forest bath

A questionair survey was conducted to investigate 1) how seasonal change of forest enhances the effect of forest bathing, and 2) is there any difference among examinees with different

background of nature experience. As a result, examinees felt much relaxation in autumn season. Those who had much opportunity of nature experience in their childhood tended to favor forests, but the experience had no influence on the effect of forestbathing.

e) Studies on precision forestry for sustainable use of forest resources

Forests are expected to be one of the most important resources not only as environmental resources but also material and energy resources for the future society with an environmentally-sound material cycle. Site-adapted forest management with precision forestry technologies is essential for highly sustainable utilization of diverse forest functions. Therefore, (1) monitoring forest resources by using remote-sensing data, (2) GPS performance under tree canopies, (3) estimation of wildlife habitat by using GIS and GPS, and (4) environmental impacts of forest management and utilization activities, were discussed.

A-2. Publications and presentations

a) Publications

Original papers

Miyoshi, Y., T. Nobuchi: Tree growth and wood properties of over 100 years old Sugi (*Cryptomeria japonica* D.Don.) planted in Kitou forestry region in Tokushima Prefecture. Forest Research, Kyoto, 76; 9-20, 2005

Nobuchi, T., Y. Higashikawa and T. L. Tobing: Some characteristics of growth ring structure and heartwood formation of teak (*Tectona grandis*) --Comparison of two plantation sites, central and west Java, Indonesia--Forest Research, Kyoto, 76, 33-38, 2005

Tachiki. Y., T. Yoshimura, H. Hasegawa, T. Mita, T. Sakai, F. Nakamura: Effects of polyline simplication of dynamic GPS data under forest canopy on area and perimeter estimations. J.For.Res. 10(6), 419-427, 2005

Katayama, Y., T. Aoki, M. Nagai, T. Nagatomo and N. Okada: Distribution of 90Sr in the tree rings of a Japanese cedar exposed to the black rain from the Nagasaki atomic bomb. J. Radioanal. Nucl. Chem. 267(2), 279-286, 2006

Yamashita, K. N. Okada, K. Kamo: Application of the wire dendrometer for monitoring the radial growth on trees – A comparison with the conventional band dendrometer and the pinning method-. Mokuzai Gakkaishi8(1); 8-18, 2006

Reports

Yoshimura, T., Tachiki, Y., and Hasegawa, H.: Design and evaluation of a GPS-based navigation system for forestry workers. International Scientific Conference "Ecological, Ergonomic and Economical Optimization of Forest Utilization in Sustainable Forest Management" (Scientific Issue of the Hugo Kollataj Agricultural University of Cracow No. 419, Scientific Session Issue 91): 83-88, 2005.6

Tachiki, Y., Yoshimura, T., Hasegawa, H., Mita, T., Sakai, T., and Nakamura, F.: GPS positioning accuracy while walking under forest canopy in summer and winter seasons. Journal of the Japan Forest Engineering Society 20(1), 23-28, 2005

Hasegawa, H.: How can we thin plantation trees sustainably, use them thoroughly, and make profits by them. - Report on the 12th Workshop on Forest Production System -, J. Jpn. For. Eng. Soc.20(1), 35-40, 2005

Miyata, E., Greulich, F., and Hasegawa, H.: Forest Fires in Western USA (I), Mountainous Forest, 2005

Miyata, E., Greulich, F., and Hasegawa, H.: Forest Fires in Western USA (II), Mountainous Forest, 2005

Hasegawa H.: What is "Healthy Forest"? Forest Mechanization618, 10-12, 2005

Hasegawa H.: "Emergency Thinning" in USA. Forest Mechanization619, 11-13, 2005

Hasegawa H.: The situation of American homecenters. Forest Mechanization620, 10-12, 2005

Hasegawa H.: Summer vacation in Seattle. Forest Mechanization622, 14-16, 2005

Hasegawa H.: Precision Forestry. Forest Mechanization625, 15-16, 2005

Hasegawa H.: Forests as common property. Forest Mechanization627, 51-53, 2006

b) Conference and Seminar papers presented

The 117th Ann. Meet. Jpn. For. Soc. (1 presentation)

The 15th Ann. Meet. Jpn. Soc. Trop. Eco. (2 presentation)

The 53th Ann. Meet. Eco. Soc. Jpn. (4 presentation)

The 6th Pac. Reg. Wood Ana. Con. (3 presentation)

A-3. Off-campus activities

Membership in academic society (roles)

Hasegawa, H.: Society of Forest Spatial Utilization (executive)

Hasegawa, H.: Society of Forest Production (executive)

Research grant

Monbu-Kagakusho Research Grant: Scientific Research (A) (Overseas) Ecological wood anatomy of tropical trees (Okada, head; Nobuchi), Scientific Research (B) Influence of yellow sand on the forests in Japan, and the origin of dry fallout and its contribution to acidification (Okada)

A-4. International cooperation and overseas activities

International meetings (roles)

Hasegawa, H.: Forest Sustainability and Positional Information (Seminar at the University of Washington, USA).

International joint researches and overseas research survey

Hasegawa, H.: Overseas Advanced International Education and Research Support Program (University of Washington, USA).

Nobuchi, T., Okada, N.: Characterization of wood formation in tropical trees (Thailand, Malaysia).

B. Educational Activities (2005.4-2006.3)

B-1. On-campus teaching

a) Course given

Undergraduate level: Basic Science for Forest and Biomaterials IV (Nobuchi), Forest Utilization (Nobuchi), Tree Physiology (Okada), Reading of foreign literature II (Nobuchi), Laboratory Course in Forestry and Biomaterial Science IV (Okada, Nobuchi), Comprehensive Practice in Forest (Okada, Nobuchi), Practice for Forest Utilization (Okada, Nobuchi), Seminar in Forest Utilization (Nobuchi, Okada), Introduction to Research (Nobuchi, Okada)

Graduate level: Special Lecture on Forest Utilization II (Okada), Scientific writing and presentation in English (Okada), Seminar in Forest Utilization (Nobuchi, Okada),

C. Other remarks

Hasegawa, H.: Committee to conserve rich forests and clear streams in Ide (vice-chairman)

2.2.5 Laboratory of Forest Biology

Staff *Lecturer* : *Takayanagi, Atsushi, Dr. Agric. Sci*
Assistant Professor : *Yamasaki, Michimasa, Dr. Agric. Sci*
Students and research fellows
Doctor's program : (8)
Master's program: (8)
Undergraduate : (3)
Research fellow : (1)

A. Research Activities (2005.4-2006.3)

A-1. Main subjects

a) Forest damage by Big Mammals

In order to know the mechanism of black bear bark stripping damage, we investigated the nutritional traits of inner-bark of *Crytomeria japonica*, damages in natural forests. DNA analysis of hairs sticking on scars can identify black bear. Shoot breakage by Sika deer was happened mostly from April to July and strong relationships with phenology of plants. Damages on *Aucuba japonica*, a favorite species of deer, were occurred widely in Higashiyama area in Kyoto city, but wide ranges of damage rate were observed. Biomass under several Artificial Cryptomeria japonica stands were estimated.

b) Mass mortality of oak trees caused by the ambrosia beetle, *Platypus quercivorus*

The ambrosia beetle, *Platypus quercivorus*, causes mass mortality of oak trees by transporting pathogenic fungi from trees to trees. Infestation patterns of *P. quercivorus* on Fagaceae tree species with different susceptibility to this disease were investigated. Though there were no differences in the flying population of beetles among tree species, hole boring and mating processes of the beetle were different among tree species.

c) Reproductive strategy of plants

The relationship between the shoot elongation pattern and the reproduction was studied with regard to trees of genus *Betula*. Interactions between the clonal and the sexual reproduction were studied with respect to the clonal plant, *Dioscorea japonica*.

d) Food habits of bears

Comparative studies on Hokkaido brown bear using stable isotope clarified the differences of food habits between eastern area and Oshima peninsula. Arboreal feeding of black bear had relationships not only with quantities of food on trees but on the ground.

e) Seed disperser and plants

Interaction between seed eating bird species and plant are investigated. Comparative study

on wind-dispersal and scatter hording by field mice was conducted.

A-2. Publications and presentations

a) Publications

Books

Takayanagi, A.: Mammals, Red data book of Shiga prefecture 2005, p.270, 2006

Original articles

Yamasaki, M.: What causes spatio-temporal variations in leaf herbivory levels within a canopy of Fagus crenata? Proceedings: IUFRO Kanazawa 2003 "Forest Insect Population Dynamics and Host Influences"; 31-36, 2006

Miyazawa, Y. and K. Kikuzawa: Physiological basis of seasonal trend in leaf photosynthesis of five evergreen broad-leaved species in a temperate deciduous forest. Tree Physiology 26; 249-256, 2006

Miyazawa, Y. and K. Kikuzawa: Photosynthesis and physiological traits of evergreen broadleafed saplings during winter under different light environments in a temperate forest. Canadian Journal of Botany 84; 60-69, 2006

Mizuki, I., N. Tani, K. Ishida and Y. Tsumura: Development and characterization of microsatellite markers in a clonal plant, Dioscorea japonica Thunb. Molecular Ecology Notes 5; 721-723, 2005

Mizuki, I., N. Osawa and T. Tsutsumi: Thrips (Thysanoptera: Thripidae) on the flowers of a dioecious plant, Dioscorea japonica (Dioscoreaceae). Canadian Entomologist 137; 712-715, 2005

Ali. M.S. and K. Kikizawa: Shoot morphology of Aucuba japonica incurred by anisophylly: ecological implications. Journal of Plant Research 118; 329-338, 2005

Ali. M.S. and K. Kikizawa: Plasticity in leaf-area density within the crown of Aucuba japonica growing under different light levels. Journal of Plant Research 118; 307-316, 2005

Mizuki, I., K. Ishida and K. Kikuzawa: Sexual and vegetative reproduction in the aboveground part of a dioecious clonal plant, Dioscorea japonica (Dioscoreaceae). Ecological Research 20; 387-393, 2005

b) Conference and seminar papers presented

IX International Mammalogical Congress (7 presentations)

IX International Congress of Ecology (2 presentations)

The 4th International Symposium of Gall Forming Insects (1 presentation)

52nd Annual Meeting of The Japanese Ecological Society (4 presentations)

The 2nd Scientific Congress of East Asian Federation of Ecological Societies (4 presentations)

50th Annual Meeting of the Japanese Society of Applied Entomology and Zoology (2 presentations)

A-3. Off-campus activities

Membership in academic societies

Takayanagi, A. Mammalogical Society of Japan (Audit)

Research grants

Yamasaki, M.: Ministry of Education, Science, Sports and Culture of Japan; Survey and Application of antagonistic fungi in controlling of a forest epidemic, Japanese Oak Wilt

(share)

B. Educational Activities (2005.4-2006.3)

B-1. On-campus teaching

a) Courses given

Undergraduate level: Wildlife Conservation Science (Takayanagi), Laboratory Course in Forest and Biomaterials Science I (Kikuzawa, Takayanagi, Yamasaki), Laboratory Course in Forest and Biomaterials Biology (Takayanagi), Laboratory Course in Ecology (Takayanagi, Yamasaki), Practice in University Forests II (Takayanagi)

Graduate level: Forest biology II (Takayanagi), Seminar in Forest Biology (Takayanagi, Yamasaki), Laboratory Course in Forest Biology (Takayanagi, Yamasaki)

B-2. Off-campus teaching, etc.

Takayanagi: Lecture at seminar of Bukkyo University (2005.7.2/7.9), Lecture at Society for the natural environmental research in Shiga (2005.7.16), Lecture at Fukui Prefectural School of Agriculture and Forestry (2005.8.9), Lecture at Kansai Yotuba Renrakukai (2005.8.27), Lecture at 2005 Wildlife manager education program (2005.9.7), Lecture at 2005 Forest and Wildlife manager education program (2005.9.14/9.15), Starting ceremony of Yamashina ward action team for monkey damage (2005.10.2), Lecture at Senior Nature University (2005.11.12), Lecture at Symposium on coexistence of human and wildlife (2005.11.19), Ohara Kankyo Juku (2005.12.3), Lecture at Workshop on Making Forest for both people and wildlife (2006.1.29), Lecture at National Agricultural Research Center for Western Region (2006.2.2), Lecture at council for wildlife damage problem in Koka-Konan area (2006.3.16)

Chair of Forest Environment Conservation

2.2.6 Laboratory of Landscape Architecture

Staff *Professor* : *Morimoto, Yukihiro, Dr. Agri. Sci.*
Assistant Professor : *Imanishi, Junichi, Dr. Agri. Sci.*

Students and research fellows

Doctor's program : *(6)*
Master's program : *(8)*
Undergraduate : *(4)*
Research Student : *(1)*
Special Research Fellow : *(1)*

A. Research Activities (2005.4-2006.3)

A-1. Main subjects

a) Theory and history of landscape design

History and theory of modern landscape design have been researched continuously. The purpose of the studies is to clarify the social significance of public open spaces through the researches on economic and political backgrounds.

b) Re-vegetation and conservation research

Technological studies on conservation of forest and wildlife habitat have been researched through works in urban forest.

c) Landscape and land-use planning research

Landscape and land-use preference studies on open space in urban and urban fringe areas are conducted in order to get landscape and land-use planning theory.

d) Practice in landscape design

This laboratory has participated in the practical processes of several projects such as parks and urban planning.

A-2. Publications and presentations

a) Publications

Books

Morimoto, Y. et al. (2006) The Forest Environment 2006 (Forest Culture Association ed.), 271pp, The Asahi Shimbun Company, Tokyo, 271pp.Tokyo

Morimoto, Y. et al. (2005) Shimomura, "Freen Architecture and Environmental Symbiosis", Hoyano & Koshimizu eds., Soft Science Inc. pp.325, Tokyo

Original papers

Isoda, K., Imanishi, J., Kimura, Y., Hasegawa, S., Morimoto, Y.: A simulation analysis on the effectiveness of Shisen peat as a soil for roof top planting. Journal of the Japanese Society of Revegetation Technology 31(1); 27-32, 2005

Imanishi, A., J. Imanishi, K. Murakami, Y. Morimoto and A. Satomura: Herbaceous plant species richness and species distribution pattern at the precincts of shrines as non-forest

greenery in Kyoto city. Journal of the Japanese Society of Revegetation Technology 31(2); 278-283, 2005

Imanishi, A., K. Murakami, J. Imanishi, Y. morimoto and A. Satomura: Herbaceous plant species richness and species distribution pattern at fragmented forests in Kyoto City. Journal of the Japanese Society of Revegetation Technology 31 (1); 51-56, 2005

Imanishi, A., Imanishi, J., Murakami, K. and Morimoto, Y.: A study for conservation of herbaceous plants at urban green spaces: a comparison to suburban secondary forest. Journal of Landscape Architecture in Asia 1; 127-132, 2005

Imanishi, J., Shimabayashi, Y. and Morimoto, Y.: A new analytical method for wildlife habitat conservation planning on a city scale using the classification of physiologically homogeneous areas. Landscape and Ecological Engineering 1(2); 157-168, 2005

Ogawa, N., Fukamachi, K., Oku, H., Shibata, S., Morimoto, Y.: Study on Transition and Succession of Village Landscape of *Sasabuki* in the Tango Peninsula. Landscape Research Japan 68(5); 627-632, 2005

Osawa, N., A. Terai, K. Hirata, A. Nakanishi, A. Makino, S. Sakai, and S. Shibata: Logging impacts on forest carabid assemblages in Japan. Canadian Journal of Forest Research 35; 2698-2708, 2005

Sasaki, Y. and Morimoto, Y.: The effect of the offshore breakwater on the settlement of the coastal vegetation on an artificial beach of Seto Inland Sea. J.Jpn. Soc. Reveget. Tech. 31(1); 69-74, 2005

Sasaki, Y., Shibata, S. and Morimoto, Y.: The prediction and healthiness of plant species structure of coastal vegetation on semi-natural and artificial coasts of the Seto Inland Sea. J.Jpn. Soc. Reveget. Tech. 31(3); 364-372,2006

Satomura, A., Imanishi, J., Morimoto, Y., Kojima, A.: A study of diagnostic indices of vitality of *Prunus jamasakura*. Journal of the Japanese Society of Revegetation Technology 31(1); 15-20, 2005

Hashimoto, H., Murakami K., Morimoto, Y.: Relative species - area relationship and nestedness pattern of woodland birds in urban area of Kyoto City. Landscape Ecology and Management 10(1); 25-35, 2005

Hashimoto, H., Sawa, K., Tabata, K., Morimoto, Y., Nishio, S.: Characteristics of legacy trees with hollows in the urban area of Kyoto City, Japan. Landscape Research Japan 69; 529-532, 2006

Horikawa, M., Natuhara, Y., Maenaka, H., Morimoto, Y., Ishida, K.: Evaluation of a basin ecosystem in arid region using satellite remote sensing. Landscape Ecology and Management 10(1); 11-23, 2005

Murakami, K., A. Makino, Y. Morimoto and A. Satomura: Is a single large patch or several small patches more important in strategies for conservation of plant species richness in urban fragmented woodlots? Journal of the Japanese Institute of Landscape Architecture 68(5); 633-636, 2005

Yoshida H. and Morimoto Y.: A study on the effects of mixed seeding of Chinese-grown Indigofera spp. and evergreen broad-leaved trees, J.Jpn.Soc.Reveget.Tech.,31(2), 269-277

Reports

Imanishi, J., Morimoto, Y., Imanishi, A., Suzuki, A.: Report of Expo 2005 Biolung Vegetation Monitoring. Organization for Landscape and Urban Green Technology Development,

2006

Okazawa, T., Tsubaki, M., Yoshioka, T., Imanishi, J.: Development of Plant Production Technology for Roof top and Wall Vegetation (Development Project), Floricultural Research Summary of 2005. National Institute of Floricultural Science, p.Tokyo-07, 2006

Morimoto, Y. (2006)Quantitative evaluation of ecosystems for nature restoration, Proceedings of Environmental Engineering Symposium 2000 of Okayama University. IV9-IV14

Morimoto, Yukihiro(2006) Disaster and Biodiversity: Landscape Ecological Lessons from Japanese Experiences, GSGES Asia Platform Annual Report 2005, 14-16

Morimoto, Y.(2006) Essential Landscape of Kyoto: Shimogamo shrine: Brown Hawk Owl in Tadasu-no-Mori Forest. Green Power 2006(1), Forest Culture Association, Tokyo.

Morimoto, Y.(2006) Essential Landscape of Kyoto: Japanese bitterling in the pond of Heian-Jingu Shrine sacred garden. Green Power 2006(2), Forest Culture Association, Tokyo.

Morimoto, Y.(2006) Essential Landscape of Kyoto: Landscape of Shugakuin detached palace garden . Green Power 2006(3), Forest Culture Association, Tokyo.

Morimoto, Y. (2005) The direction of ecological engineering in nature restoration, Green Age2005 (10)

b) Conference and seminar papers presented

Annual meeting of JALE (3)

Annual meeting of the Ecological Society of Japan (3)

Annual meeting of JILA (1)

Annual meeting of the Japanese Society of Revegetation Technology (4)

International Symposium on Wetland Restoration 2006 (4)

Society for Conservation Biology Asia Section 1st Regional Conference, 2005 (3)

A-3. Off-campus activities

Membership in academic societies

Morimoto, Y.: Japanese Institute of Landscape Architecture (Auditor), Japanese Society of Revegetaion Technology(President), Japanese Society of Landscape Ecology (Vice President), Environmental Information Center (Councilor), Science Council of Japan Forest Engineering Group (19th period council member), Landscape and Ecological Engineering (Chief Editor), Internaional Federation of Landscape Architects - Japan, board member

Imanishi, J.: International Consortium on Landscape and Ecological Engineering (Editorial Office), Japanese Institute of Landscape Architecture (Member of Editorial Board for Techinical Report), Japanese Institute of Landscape Architecture Kansai Branch (Secretary), Japansese Association for Landscape Ecology (Expert Member)

Research grants

Morimoto, Y.: JSPS Grants-in-Aid for Scientific Research. (A) (1) Development of the HEP in ecosystem assessment process. (delegate: Morimoto, Y.)

A-4. International cooperation and overseas activities

International meetings

Horikawa, M., Natuhara, Y., Morimoto, Y. and Ishida, N. Identification of migration route and evaluation of suitable habitat of Dalmatian Pelican by using satellite tracking in Central

Asia, International Symposium on Wetland Restoration, Ohtsu, Jan 2006.

Zhu, W-H., Kim, K-G., Imanishi, J., and Morimoto, Y. Classification and spatial distribution of wetlands at Tumen River lower stream area. International Symposium on Wetland Restoration 2006. Otsu, Japan. 2006.1.

Hashimoto, H., Sawa, K., Tabata,K., Morimoto, Y., Nishio, S.: Characteristics of legacy trees with hollows in the urban area of Kyoto City, Japan. The Society for Conservation Biology Asia Section 1st Regional Conference, 2005

Horikawa, M., Natuhara, Y., Morimoto, Y. and Ishida, N. Habitat evaluation of Dalmatian Pelicans by using satellite tracking and satellite image Terra/MODIS, Asia Section of the Society for Conservation Biology Katmandu Meeting Agenda, Katmandu Nepal. Nov 2005.

Sasaki, Y., Shibata, S. and Morimoto, Y.: The prediction and evaluation of plant species structure of coastal vegetation on semi-natural and artificial coasts of the SETO INLAND SEA in Japan. The society for conservation biology Asia section, 2005

B. Education Activities (2005.4-2006.3)

B-1. On campus teaching

a) Courses given

Undergraduate level: Landscape Architecture Part I, II (Morimoto, Y.), Planting Design for Landscape (Morimoto, Y. and Shibata, S.), Landscape Planning (Hayashi, M.), Practice in Landscape Planning and Design Part I, II (Morimoto, Y. and Imanishi, J.), Laboratory Course in Applied Forest and Biomaterials Science (Morimoto, Y. and Imanishi, J.), Laboratory Course in Forest and Biomaterials Science IV (Morimoto, Y. and Imanishi, J.), Forest and Biomaterials Science, IV (Morimoto, Y.)

Graduate level: Seminar in Landscape Architecture (Morimoto, Y.), Laboratory Works in Landscape Architecture (Morimoto, Y.)

Graduate School of Global Environmental Studies: Landscape Ecology and Planning (Morimoto, Y.), Seminar in Landscape Ecological Conservation (Morimoto, Y.), Theory of Ecological Impact Mitigation (Morimoto, Y.), Internship in Environmental Management (Morimoto, Y.), Seminar on Environmental Management (Morimoto, Y. and Imanishi, J.)

B-2. Off-campus teaching, etc.

Part-time lecturer

Morimoto, Y.: Kyoto Prefecture University (Landscape Design, Forest Management)

Imanishi, J.: Kyoto Seika University (Landscape Design)

Open seminar

Morimoto, Y.: The 3rd Shimadai-Juku by GES, Kyoto University. “Green of Kyoto, Green of World - Lessons from Bamboo” Brief Comment

Morimoto, Y.: Instructor of Temple Visits (Joruri-Ji, Enjo-Ji, Manpuku-Ji)

Morimoto, Y.: Kyoto University Spring-Autumn Lectures. “Kyoto of Gardens”, Aug. 22, 2005

Morimoto, Y.: Instructor for Roads and Greenery Exchange Meeting (Japan Highway Landscape Association)

Morimoto, Y.: Japan Greenery Research and Development Center, Instructor of Urban Environmental Revegetation Promotion Research Group.

Morimoto, Y.: Asahi Nature Class. “Kyoto in Winter: Walking at Shimogamo Shrine and Tadasu Forest” Instructor, Feb. 25, 2006.

Morimoto, Y.: Next Generation Integrated Medicine Research Group. “Gardens and Environments of Kyoto” Instructor, Seifu-So, 2005.9.21

Imanishi, J.: Field Class of Califorinia State University. “Japanese Gardens”, Instructor, Kyoto University, March 22, 2006

Imanishi, J.: Council of Technical Experts of Japanse Gardens as Cultural Heritage. “Vegetation of Seifu-So Garden”, Instructor, Seifu-So, Kyoto, Jan. 22, 2006

B-3. Overseas teaching

Students and research fellows from abroad

Doctor course (1) (U.S.A.)

C. Other remarks

Morimoto, Y.: temporary member of the committee of the Council of Environment., Ministry of environment, member of the committee of the council of environment, Expert Comittee for Environmental Research and Technology Promotion of Ministry of Environment., Chair of Natural Environmental General Review of Kinki Region of MLIT, Commitee Member of Environment of Osaka Prefecture, Kyoto City Scenice Beauty Committee, Kyoto City Scenic Beauty Consultant, Kyoto City City Planning Board Member, Kyoto City Environment Board Member, Osaka Prefecture, member of the committee of city planning, Osaka Prefecture, member of the committee of the council of park and greenery, Kobe city, member of the committee of the council of amenity, Kyoto City, Chairman of the council of urban greenery initiative, Kyoto City, Director of the Society of Urban Greenery initiative, Kyoto City. Councilor of Japan Highway Landscape Association, Member of the council of Kyoto Prefecture Public Corporation for greenery, chairman of the counsil of Tanakamiyama-100-nen-no-moridukuri, chairman of the committee of Yodo river conservation and use, Research Advisor of Organization for Landscape and Urban Green Technology Development, Chair of Green Management Technology Comittee (MLIT Kinki Region Office), Chair of Selection Board of Designated Management Organization of Nagai Botanical Garden and Sakuya Konohana House, Drafting Committee of Landscape Creation of Kyoto (Kyoto City), Satochi Satoyama Model Project Investigative Committee (Ministry of Environment), Makio River Dam Natural Environmental Committee (Osaka Prefecture), Hayasaki Inner Lake Restoration Planning Investigative Committee (Otsu City), Kizu Region Town Planning Investigative Committee (Urban Renaissance Agency), Plans Board of International Symposium of Wetland Restoration 2006 (Otsu City), NPO Green Environment Executive Board Member, NPO Association for Nature Restoration and Conservation Executive Board Member

2.2.7 Laboratory of Erosion Control

Staff *Professor* *: Mizuyama, Takahisa, Dr. Agric. Sci.*
Associate Professor: Satofuka, Yoshifumi, Dr. Eng.
Assistant Professor : Kosugi, Ken'ichirou, Dr. Agric. Sci.
Students and research fellows
Doctor's program: (3)
Master's program: (9)
Undergraduate : (3)

A. Research Activities (2005.4-2006.3)

A-1. Main subjects

a) Mechanism of sediment movement

Basic research has been carried out on debris flow, flash flood, and shallow landslide. The relationship between shallow landslide and underground pipe flow and the flow in bedrock are studied particularly.

b) Countermeasures to prevent or reduce sediment disasters and the Sabo-planning being compatible with environmental concerns. More effective permeable dams are experimentally investigated in order to store the excessive sediment and, at the same time, not to damage the eco-system established in the streams. A function of a series of slit sabo dams was studied by flume experiments and computer simulation.

c) Forest influence on the hydrologic cycle

Elements controlling hydrologic cycle in forest are studied. Effects of forest soil hydraulic properties on water discharge from forested watersheds are analyzed by laboratory experiments, field measurements, and numerical simulation methods. Evapo-transpiration is one of the major factors. Models to interpret the phenomena are built.

d) Sediment movement and integrated sediment management in river system

Sediment production process and sediment movement process in mountain region are investigated using a video camera system and turbidity meters. A numerical model for calculating sediment routing is also developed. Using these results, the sediment management for mitigating sediment-related disaster and providing better natural environment from mountains to seashore is studied.

e) Sediment related disasters

Debris flow disasters were surveyed in Venezuela where debris flows and landslides occurred in December, 1999. Following debris flows from landslides, landslide dams and other damages by September 21 Taiwan Earthquake were surveyed in the field. Mudflow was studied in Miyake Island after eruptions.

f) Buffer green belt against sediment hazards

The effects of trees against debris flow and landslide are studied to design buffer green belts. Infiltration and water storage characteristics are studied in different tree kinds.

A-2. Publications and presentations

a) Publications

Books

Mizuyama, T.; Encyclopedia of Environment Revegetation, edited by, Jpn. Soc. Revegetation Technology, Asakura, 2005.

Kosugi, K. .; Encyclopedia of Environment Revegetation, edited by, Jpn. Soc. Revegetation Technology, Asakura, 2005.

Kosugi, K.; Water Encyclopedia : Water Quality and Resource Development, edited by, Lehr, J.H., Keeley, J.W., Lehr, J.K., Kingery, T.B., Wiley, 2005.

Original papers

Satofuka,Y and T.Mizuyama; Numerical simulation on a debris flow in a mountainous river with a Sabo dam, Jour.of JSECE 58-1, 14-19, 2005

Tsuchiya,S., T.Mizuyama and H.Ikeya; Debris disasters caused by deep slope failures and debris flows triggered by heavy rainfall during Typhoon Aere in the east mountainous region of Hsinchu Prefecture, Taiwan, Jour.of JSECE 58-1, 31-36, 2005

Terunuma,T., K.Nishida, T.Amada, T.Mizuyama, I.Sato and M.Urai; Detection of traces of pyroclastic flows and lahars with satellite synthetic aperture radars, International Journal of Remote Sensing 26-9, 1927-1942, 2005

Oda,A., Y.Hasegawa, T.Mizuyama, K.Miyamoto, M.Nonaka; The application of bed load measurements to hydraulic model experiments using the hydrophones, Jour. of JSECE 58-2, 15-25, 2005

Fujita,M., T.Mizuyama, T.Sawada; Restoration process of poolks filled up with sediment in step-pool bed form, Jour. of JSCE 58-3, 25-33, 2005

Kinoshita,A., M.Fujita, M.Tagawa, T.Mizuyama, T.Sawada; The physiological impact of turbid water caused by sediment flushing on fish and a prediction method, Jour. of JSCE 58-3, 34-43, 2005

Mori,T., T.Itou, T.Mizuyama, A.Oda; Occurrence of landslide in the landslide dam bursting processes, Jour. Of JSCE 58-4, 41-45, 2005

Onda,Y., M.Tsujimura, T.Tanaka, K.Sasaki, T.Mizuyama, T.Uchida, O.Tainaka, H. Tanaka; Determining the criteria rainfall for debris flow warning and evacuation by rainfall-runoff response, Jour. of JSECE, 58-5, 13-17, 2006

Kosugi, K., S. Katsura, M. Katsuyama, and T. Mizuyama; Water flow processes in weathered granitic bedrock and their effects on runoff generation in a small headwater catchment, Water Resour. Res., 42, W02414, doi: 10.1029 / 2005WR004275, 2006

Mukhlisin, M., K. Kosugi, and T. Mizuyama; Effects of soil porosity on slope stability and debris flow runout at weathered granitic hillslope, Vadose Zone J. 5, 283-295, 2006.

Katsura, S., K. Kosugi, N. Yamamoto, and T. Mizuyama; Saturated and unsaturated hydraulic conductivities and water-retention characteristics of weathered granitic bedrock, Vadose Zone J., 5, 35-47, 2006.

Kosugi, K.; Application of soil physics to rainwater dynamics at forested hillslope, J. Jpn. Soc. Soil Phys., 100, 15-26, 2005.

Satofuka, Y.; Influence of slope failure process on flood and sediment runoff in a mountain river, Jour. of Hydraulic Engineering, Vol. 50, 1057-1062, 2006.

Reviews

Mizuyama,T.; Introduction to Sabo Engineering (14) Landslide dam, Sabo and Chisui 164, 38-1, 112-114, 2005

Mizuyama,T.; Introduction to Sabo Engineering (15) Sediment control in a river system, Sabo and Chisui 165,38-2, 76-77, 2005

Mizuyama,T.; Introduction to Sabo Engineering (16) Evacuation and critical rainfall, Sabo and Chisui 166, 38-3, 91-93, 2005

Mizuyama,T.; Introduction to Sabo Engineering (17) Flood control effect of forest, Sabo and Chisui 167, 38-4, 87-88, 2006

Mizuyama,T.; Introduction to Sabo Engineering (18) Sediment hazards by earthquakes, Sabo and Chisui 168, 38-5, 123-125, 2005

b) Conference and seminar papers presented

The 116th annual meeting of Japanese Forestry Society (7 presentations)

2005 annual meeting of Japan Society of Erosion Control Engineering (22 presentations)

2006 annual conference of European Geological Union (4 presentation)

Gravel Bed River 6 Congress (1 presentation)

A-3. Off-campus activities

Membership in academic societies (roles)

Mizuyama, T.: Japan Society of Erosion Control Engineering (director, vice president), Japanese Geomorphological Union (member of committee), Japan Society of Revegetation Technology (councilor)

Satofuka, Y.: Japan Society of Erosion Control Engineering (member), Japan Society of Civil Engineering (member), Japan Society for Natural Disaster Science (member)

Kosugi, K.: Japan Society of Erosion Control Engineering (member), Japanese Forestry Society (member), Japan Society of Hydrology & Water Resources (member)

Research grants

Monbusho research grant: General scientific research (B) (2); Joint Research on control of floods and sediment movement in Semalang, Brantas and Toba Basins (Fujita and Satofuka), General scientific research(C) (2); Sediment Run-off from sabo dams and its impact on river environment (Head: Fujita, Mizuyama), Encouragement (B); Real-time prediction of sediment disasters using high resolution rainfall data (Head: Satofuka), General scientific research (B) (1); A new hydrology model for small forest watersheds by considering water movement in weathered rocks (Head: Kosugi)

A-4. International cooperations and overseas activities

International Meetings

Satofuka, Y.: 13th Congress of APD-IAHR, Singapore (Presentation)

Kosugi, K: Annual conference of European Geological Union (Presentation)

Membership in international academic societies

Mizuyama, T.: IAHR, IAHS, IUFRO-J, International INTERPRAREVENT

Satofuka, Y.: IAHR

Kosugi, K.: SSSA, IAHS, IUFRO-J, AGU

International joint researches, overseas research surveys

Mizuyama, T.: Research on erosion in sediment movement after the 1999 eathquake (Taiwan)

Satofuka, Y.: Joint Research on control of floods and sediment movement in Semalang, Brantas and Toba Basins (Indonesia)

Editors of International Journals

Mizuyama, T.: Editor of Journal of Hydrological Sciences

B. Educational Activities (2005.4-2006.3)

B-1. On-campus teaching

a) Courses given

Undergraduate level: Regional Environment Creation (Mizuyama), Theory of Erosion Control 1,2 (Mizuyama), Practice in Erosion Control (Mizuyama, Fujita), Planning of Erosion Control (Mizuyama, Fujita), Foreign Literature in Forestry 3 (Mizuyama, Fujita), Practice of Surveying (Fujita), Special Seminar on Erosion Control 1,2 (Mizuyama, Fujita), Science of Water, soil and vegetation (Fujita)

Graduate level: Theory of sediment induceddisaster control (Satofuka), Advanced theory of Erosion Control (Mizuyama), Advanced experiment of Erosion Control (Mizuyama, Satofuka), Seminar of Erosion Control (Mizuyama, Satofuka)

B-2. Off-campus teaching, etc.

Part-time lecturer

Mizuyama, T.: Fac. Agriculture, Kyoto Prefectural Univ. (Materials and constructive methods), Fac. Agriculture, Kobe University (Environmental Engineering), Japan International Cooperation Agency (Infrastructure)

Satofuka, Y.; Fac. Engineering, Ritsumeikan Univ. (Hydraulic experiment)

B-3. Overseas teaching

Students from abroad: 1 (Taiwan)

Researchers from abroad: 1 (Israel)

Chair of Biomaterials Technology

2.2.8 Laboratory of Biomaterials Design

Staff *Lecturer* *: Nakamura, Masashi, D. Agric. Sci.*
Assistant Professor : Murata, Koji, D. Agric. Sci.
Students and research fellows
Doctor's program : (1)
Master's program: (4)
Undergraduate : (7)

A. Research Activities (2005.4-2006.3)

A-1. Main subjects

a) Sensibility stimulation properties of wood: Wood is one of the most friendly and comfort giving material for human life. Dominant factors of such effects are investigated scientifically and its application to interior designing were studied. For example; i) Investigation on visual characteristics of wood, especially, grain figure, color and glossiness, and its application to the designing of interior space and furniture. ii) Generation of wood grain figures by computer graphics, iii) Formulation of relations between psychological images, especially 'natural' and 'comfortable' images and physical characteristics of visual images, iv) Psycho-rheological studies of wood *i.e.* relations between human responses and thermal insulating, tactile and impact absorbing properties of wood, walkability of wooden floor.

b) Fracture Mechanics of anisotropic materials, and strength designing for wooden structural elements: Metal and plastics are isotropic materials but wood is an anisotropic material. Strength of wood parallel to the grain is extremely high because of its cellulose filament winding around the cell walls. This is the reason why wood is light and strong. Because of this reason wood is consequently used for building and furniture in large quantities. Mechanics of anisotropic material is necessary for designing of these structural elements. Real stresses-strains curve was measured using image correlation technique.

c) Nondestructive grading of lumber: Wood has large deviation in strength like as other natural products. Since strength of fifth percentile exclusive limit is generally used for strength designing, nondestructive grading is important for effective use of wood resources. Thermal changes during repeated bending were tried to use for detecting defects (knot and others), and deflection distribution curves and optical properties were also used for evaluating strength.

d) Studies on mechanism of anisotropy of swelling of wood and wood cell walls under a laser microscope using digital image correlation method.

A-2. Publications and presentation

a) Publications

Original papers

J. Itoh, M. Nakamura and M. Masuda: Relations between Combinations of Interior Components and the Image of "Japanese-style vs. Western-style." Trans. of Japan Society for Interior

Studies, 15; 19-24, 2005 (in Japanese with English summary)

K. Murata, M. Masuda and S. Ukyo: Analysis of Strain Distribution of Wood Using Digital Image Correlation Method - Four-Point Bend Test of Timber Including Knots -. Transaction of the Visualization Society of Japan, 25 (9); 57-63, 2005 (in Japanese with English summary)

b) Conference and seminar papers presented

The 53rd Annual Meeting of Japan Society of Physiological Anthropology, Nagasakai, Jun. 10-11, 2005: an invited speaker in the symposium (Nakamura)

49th Japan Congress on Materials Research, Kyoto, July.15-16, 2005: 2presentations (Murata)

IAWPS 2005 International Symposium on Wood Science and Technology, Yokohama, Nov. 27-30,2005: 4 presentations (Nakamura, Murata)

A-3. Off-campus activities

Membership in academic societies

Nakamura, M.: The Japan Wood Research Society (Editorial board member of the journal, Member of the committee for information processing, Secretary of the Division of Living Comfort); Japan Society of Physiological Anthropology (Trustee for public relations); Wood Technological Association of Japan (Member of the planning committee of Kansai Branch, Editorial board member of the journal); The Society of Materials Science, Japan (Editorial board member of the journal).

Murata, K.: The Society of Matreials Science, Japan (committee member of the Division of Wood Based Materials).

Research grants

Nakamura, M.: JSPS Grants-in-Aid for Scientific Research. (A)(2) Study on physiological polytypism in technological adaptability of human.(Partial).

B. Educational Activities (2005.4-2006.3)

B-1. On-campus teaching

a) Courses given

Under graduate level: Properties of Biomaterials (Nakamura), Forest and Biomaterials Science III (Nakamura), Practice in Biomaterials Design (Nakamura, Murata), Information Technology in Forest and Biomaterials Science (Nakamura), Laboratory Course in Forest and Biomaterials Science III (Nakamura, Murata), Laboratory Course in Physics of Forest and Biomaterials (Nakamura, Murata), Laboratory Course in Wood Technology (Nakamura, Murata)

Graduate level: Seminar in Biomaterials Design (Nakamura, Murata), Laboratory Course in Biomaterials Design (Nakamura, Murata), Biomaterials Design II (Nakamura) .

B-2. Off-campus teaching, etc.

Open seminar, etc.

Nakamura, M.: “Don’t underestimate wood grain figures!” in the public seminar of Kyoto Univ “Extending the view of the forest”, Kyoto, 22-23 Oct. 2005 (lecture and member of executive committee); “Wood and living environment” in wood science seminar of wood technological association Japan Kansai branch, Kyoto, 10 Dec. 2005 (lecture).

Murata, K.: "Strain measurement of wood-based materials using the image correlation technique" in the 259th regular meeting of the Division of Wood Based Materials (The Society of Materials Science, Japan), Matsue, 2 Nov. 2005 (lecture); "Fascination of wood - with sense of sight and touch –" in Graduation Memorial Event of Ohtani Women's Junior College, Osaka, 6 Feb. 2006 (lecture).

C. Other remarks

Nakamura, M.: Member of Advisory Board for Information Systems in Faculty of Agriculture; Member of Committee for Public Relations in Faculty of Agriculture; Member of Committee for Computer Literacy in Center of Information and Multimedia Studies.

2.2.9. Laboratory of Wood Processing

Staff *Professor : Okumura, Shogo, Dr. Agric. Sci.*
Associate Professor: Fujii, Yoshihisa, Dr. Agric. Sci.
Assistant Professor : Sawada, Yutaka, M. Agric. Sci.
Assistant Professor : Yanase, Yoshiyuki, M. Agric. Sci.
Educational Assitant (part time): Fujiwara, Yuko, Dr. Agric. Sci.

Students and research fellows
Doctor's program :(1)
Master's program :(2)
Undergraduate :(3)

A. Research Activities (2005.4-2006.3)

A-1. Main subjects

a) Fundamental problems in wood machining

The main subjects are concerned with solution of cutting mechanism of wood and wood based materials and of phenomena in wood cutting, by thermographic measurement and analysis of tool-chip-work system in wood cutting. For the evaluation of the surface roughness of wood, the novel filtering method and 2D and 3D roughness parameters that coincide with tactile sensation are proposed. Influence of machine surface finishing on the performance of painted surface is also studied.

b) Improvements of woodworking machines and cutting tools and automatization of machining process. For the improvements of accuracy, efficiency and safety of the wood cutting and grinding, following subjects are studied: analysis of deformation and vibration of tool using FEM, analysis of stress generated on the tool, and prediction of concentration of airborne dust in the woodworking chamber using computer simulation and the optimization of a condition of dust collection. An algorithm of pattern recognition of the processing sound to simulate the auditory sense of the skilled worker and its master process is developed. It is also applied to the control of the grinding machine of band saw tooth to realize fully automatic control using artificial intelligence technique. Another subjects are pattern recognition of the transient signals from

wood using wavelet analysis, simulation of distribution of temperature and stress during drying wood, and simulation of roll pressing of wood using FEM as an application of CAE to the woodworking process.

c) Scanning of wood and wood based materials

The subjects on this field are use of acoustic emission (AE) for prediction of checks and for solution of mechanism of AE generation during the drying of wood, thermographic detection of starved joints of wood and the grain direction and recognition of blue stained wood with image anlysis and pattern recognition technique. Movement of free water in wood tissues under drying is also evaluated by a micro-focus X-ray CT system. Fundamental researches for the analysis of biology of wood-destroy insects and practical application for detection of termite attack using AE monitoring are studied, including developments of portable AE detector, new AE sensor using PVDF film, waveguides, and AE monitoring system for wooden house. Detection of metabolic gas components from termite colony such as H_2, CH_4 and CO_2 are also studied. Development of physical barrier using crushed cement-stabilized sludge for termite attack. Fact-findings of the damages by termite and other wood-destroy insects in the houses and cultural properties, and research of damage using AE monitoring. Detection of cavity and deterioration points in the material using radar for the non-destructive inspection of decay and damage by wood-destroy insects in the wooden house.

d) Noise and vibration of wooden house

Application of simulation of vibration property using FEM to the optimization of floor-wall structure with consideration of a measure of floor impact sound. Modal analysis of string musical instruments such as violin using FEM.

A-2. Publications and presentations

a) Publications

Books

Fujii Y.: Chapter 3 and 6 (Co-author), Countermeasures to Sickhouse Syndrome, p33-56, p.95-114, Ohmsha, 2005

Original Papers

Fujiwara, Y., Y. Fujii, S. Okumura: Relationship between roughness parameters based on material ratio curve and tactile roughness for sanded surfaces of two hardwoods, J. Wood Sci. 51, 274-277, 2005

Yanase, Y., Y. Fujii, S. Okumura, T. Yoshimura, Y. Imamura, M. Ishida, H. Kawaguchi, T. Okumura, J. Soc. Mat. Sci., Japan, 54(4), 387-391, 2005

Okahisa, Y., T.Yoshimura, Y.Imamura, Y. Fujiwara, Y.Fujii: Potential of termite attack against Moso bamboo (*Phyllostachys pubescens* Mazel) in correlation with surface characteristics, Jpn. J. Environ. Entmol. Zool. 16(2), 85-89, 2005

Fujii, Y., Y. Fujiwara, S.Okumura:Simulation of Cutting Process of Wood using Finite Element Method, Proc. of IAWPS2005, Yokohama, Nov. 27-30, p102-104, 2005

Fujiwara, Y, Y. Fujii, S. Okumura: An FE-analysis of stress and strain at tactile receptors of a fingertip in contact with wood surface. Proc. 17th Int. Wood Machining Seminar, Rosenheim, Sep. 26-28, pp.399-405, 2005

Fujiwara, Y, Y. Fujii, S. Okumura: Effect of surface irregularities of wood on coating quality – Primary profiles and material ratio curves at successing steps of coatings –. Proc. 17th Int.

Wood Machining Seminar, Rosenheim, Sep.26-28, pp.406-412, 2005

Yanase Y., Y. Fujii, S. Okumura, T. Yoshimura, Y. Imamura, H. Kawaguchi and T. Okumura: Feasibility of several particulate materials as a physical barrier against termites, Proc. 6th Int. Wood Scienece Sympodium, Bali, Aug. 29-31, p.160-164, 2005

Reviews

Fujii, Y.: History of wood processing technology and future prospect of woodworking machine industry, Woodmic, 271, 42-50, 2005

Fujii, Y.: Nondestructive inspection method for diagnoses of wooden house, Jyutaku to Mokuzai, 29(337), 22-25, 2006

Reports

Okumura, S.: Home page of the Japan Wood Research Society for interactive use. The history of JWRS for 50 years, 1955-2005 (edited by the Committee for 50th Aniversary, JWRS), pp.16-18, 2005

b) Conference and seminar papers presented

The 21th Annual Meeting of Japan Wood Preserving Association (Tokyo, 2004.5.23): 1 (Yanase, Fujii, Okumura et al.)

17 th Int. Wood Machining Seminar (Rosenheim, 2005.9.26-28):2 (Fujiwara, Fujii, Okumura)

6th Int. Wood Sci. Seminar (Bahli, 2005.8.29-31): 1 (Yanase, Fujii, Okumura et al.)

Int. Sympo. on Wood Sci. and Technol. (Yokohama, 2005.11.27-30): 1 (Fujii, Fujiwara, Okumura)

A-3. Off-campus activities

Membership in academic societies (roles)

Okumura, S.: The Japan Wood Research Society (director, chief manager for Information Processing), Wood Technological Association of Japan (councilor, director of Kansai Branch)

Fujii, Y.: The Japan Wood Research Society (editorial committee), Wood Technological Association of Japan (Kansai branch, organizing committee), The Society of Materials Science, Japan (councilor, editorial committee), Japan Wood Preserving Association (chairman of technical committee for diagnose of the biological deterioration of wooden house)

Sawada, Y.: Wood Technological Association of Japan (Kansai branch, secretary of organizing committee)

Reserach grants

Grant-in-Aid for Scientific Research (KAKENHI)

Okumura S.: Exploratory Research "Visualization of free water movement in wood during drying using a micro-focus X-ray CT system" (Representative)

Yanase Y.: Grant-in-Aid for Young Scientists (A) "Development of nondestructive monitoring system of termite infestation into bait-station"

A-4. International co-operations and overseas activities

International meetings (roles)

Okumura, S.: The 17th International Wood Machining Seminar (member of Advisory Committee)

B. Educational Activities (2005.4-2006.3)

B-1. On-Campus teaching

a) Courses given

Undergraduate level: Forest and Biomaterials Science III (Okumura), Basic Forest and Biomaterials Science III (Fujii), Wood Processing I (Okumura), Wood Processing II (Fujii), Laboratory course in physics of forest and biomaterials (Fujii, Sawada, Yanase), Laboratory course in wood processing (Fujii, Sawada, Yanase), Seminar for Forest Products Engineering (Okumura, Fujii), Information Technology in Forest and Biomaterials Science (Sawada), Reading of Foreign Literature I (Okumura), Reading of Foreign Literature II (Okumura)

Graduate level: Wood Processing II (Fujii), Seminar in Wood Processing (Okumura, Fujii), Laboratory Course in Wood Processing (Okumura, Fujii, Sawada, Yanase)

B-2. Off-campus teaching, etc.

Part-time lecturer

Okumura, S.: Faculty of Agriculture, Kyoto Prefectural University (Woodworking Machinery); Graduate School of Agriculture, Kyoto Prefectural University (Special Lecture on Woodworking Machinery)

Fujii,Y.: Graduate School of Agricultural and Life Sciences, The University of Tokyo (Woodprocessing)

B-3. Overseas teaching

Students and research fellows from abroad

Studuent (Doctor course) 1 (Ghana)

Studuent (Master course) 1 (China)

C. Other Remarks

Okumura, S.: Councilor, Education and Research Council, Kyoto University; Vice-Dean, Graduate School of Agriculture, Kyoto University; Member, Executive Committee for Self-Evaluation, Committee for University Evaluation, Kyoto University; Member, Committee for Educational System, Kyoto University; Technical Development Adviser, Hyogo Prefecture

2.2.10 Laboratory of Natural Fibrous Materials

Staff *Professor* *: Matsumoto,Takayoshi,Dr.Eng.Sci.*
Associate Professor: Yamauchi,Tatsuo, Dr.Agric.Sci.
Assistant Professor : Tatsumi,Daisuke, M.Agric.Sci.
Students and research fellows
Doctor's program : (1)
Master's program : (2)
Undergraduate : (4)

A. Research Activities (2005.4-2006.3)

A-1. Main subjects

a) Diversity of Solution Properties of Celluloses from Different Biological Origins

Cellulose is produced in nature by not only plants but also bacteria, slime mold, sea-squirts. These celluloses have been considered to have the identical molecular structure in spite of the difference of their biological origins. To clarify this, we have examined the solution properties of cellulose, using rheological measurements, light scattering measurements, and so on. As the result, it becomes clear that the molecular properties of these celluloses differ from each other in the solution. Chemically processed (i.e., mercerized) cellulose also has a unique solution property differed from that of native cellulose. The molecular properties of other related polysaccharides have also been examined.

b) Relation between Cellulose Solid Structure and Solubility

The detailed reason why cellulose is slightly soluble in general solvents is still uncertain. If the reason is made clear, novel applications of cellulose will be developed. We have examined the dissolution mechanism of cellulose, using LiCl/dimethylacetamide as a solvent. It has become clear that the celluloses from different origins dissolve in the solvent in different manners. The reason why the pretreatment by solvent substitution is required to make cellulose dissolve in the solvent at the room temperature is also uncertain. To clarify this, we have also examined the molecular mobility and surface structure of cellulose with solid-state NMR and small-angle X-ray scattering measurements. It becomes clear that the solvent substitution processing promotes the molecular mobility and the surface properties of cellulose.

c) Creation of Novel Fibrous Materials from Natural Polymer Solutions

It was found in our laboratory that LiCl/dimethylacetamide solution of bacterial cellulose forms lyotropic liquid crystal, and that tunicin (i.e., the cellulose got from sea-squirts) has very large molecular weight. We have examined the mechanism how these features appear and these characteristics as functional materials. Now we explore the manufacturing method of fiber, film, and gel which utilized features of various celluloses from different origins. The application of these materials to electrolyte membranes in fuel cells is also studied.

d) Floc Structure and Rheological Properties of Fiber Suspension

Fiber suspensions generally have remarkably higher viscosity and elasticity than spherical particle suspensions of equal volume concentration. In addition, fiber suspensions are easy to form aggregation called floc in the flow conditions. This makes them hard to deal with in various industrial fields. To clarify and improve such characteristics, we have studied on the fiber

suspensions from various approaches using theories and experimental technique such as rheological measurements and image analysis. We also try to control the flow properties and floc formation by adding mucilage such as water-soluble polysaccharides to the suspensions.

e) Deformation and Fracture of Paper

In order to clarify the differences between two tensile fracturing modes, in-plane and out-of-plane modes, of notched paper, micro failures detected as acoustic emissions(AEs), maximum load and work during tensile fracturing were measured for a series of handsheets made from unbeaten and beaten softwood and hardwood kraft pulp. Compared with in-plane fracturing, out-of -plane fracturing brought about increases in both fiber failures and failures of stronger fiber bonds. Related to the characteristic changes in micro failures, i.e. the increases in fiber failures and fiber bond failures, the cumulative energy of micro failures that occurred during the out-of-plane fracturing was remarkably larger than that of the in-plane fracturing. Difference in the total work between the two fracturing modes was not clear. However, out-of-plane fracturing required more work than in-plane fracturing within the actual fracturing period. The superiority of the out-of-plane mode for an easy-opening notched paper package surely does not arise from larger energy of micro failures and the work, but may come from the extremely low maximum load and the easier movement of hand and wrist for the out-of plane fracturing mode..

f) Role of the additives for new function development in paper materials

Many commercial papers are basically made up with pulp fibers, and further some additives are added to them in order to enhance or give the specific functions corresponding to their final usages. Transparentizing of paper by latex impregnation and successive hot pressing was investigated with regard to the pore structure observed by scanning electron microscopy and determined by mercury porosimetry. Experimental results are presented for acrylonitrile butadiene latex impregnated handsheets, which were originally prepared from unbeaten bleached softwood kraft pulp, and a series of handsheets with variety of beating degree and grammages for reference. Hot-pressing caused a drastic decrease in pore volume of relative macropores in the sheets. Latex impregnation combined with hot pressing further caused a remarkable decrease in pore volume of relative micropores. Transparentizing of paper to total transmittance of about 75% without a decrease in grammage can be realized by the latex impregnation with hot pressing due to the filling of pores with rubber. High transparency of paper is also obtainable by heavy beating with a decrease of grammage to about 30 g/m^2 . Transparentizing of paper by both methods is attributed to a decrease in volume of relative micropores having equivalent pore diameters under 1 or 2 μ m.

A-2. Publications and presentations

a) Publications

Books

Matsumoto, T.: The Flora of Kojiki. Kaiseisha, Ootsu, 2006 (in Japanese)

Matsumoto, T., D. Tatsumi (part): Rheology Data Handbook, Maruzen, Tokyo, 2006 (in Japanese)

Original papers

Yamauchi, T. and N. Usami: Characteristic Mechanical Properties of Washi Papers. Jpn. Tappi J. 59(10); 104-111, 2005 (in Japanese)

Yamauchi, T. and T. Uenaka: Transparentizing of paper by latex impregnation. Appita J.58(6); 455-458, 2005

Yamauchi, T.: Differences between in-plane and out-of-plane tensile fracturing of notched paper. J. Pack Sci and Technol 14(5); 329-340, 2005

Tatsumi, D., T. Matsumoto: Rheological properties of cellulose fiber wet webs. Advances in Rheology and Its Applications, Luo, Y.; Rao, Q.,; Xu Y. eds., Science Press USA, Monmouth Junction, 611-614, 2005

Reviews

Matsumoto, T., D. Tatsumi: Fundamentals in Rheology for CAE: rheology of disperse systems. Seikei Kako 17(8); 548-557, 2005 (in Japanese)

Matsumoto, T: Solution Properties of Cellulose, Mokuzai Gakkaishi 52(3); 129-136, 2006 (in Japanese)

b) Conference and seminar papers presented

The 55th Annual Meeting of the Japan Wood Research Society, 2 papers

The 72nd Symposium on Paper and Pulp Research, 2 papers

The 32nd Annual Meeting of the Society of Rheology, Japan, 1 paper

The 53rd the Rheology Symposium, 1 paper

The 12th Annual Meeting of the Cellulose Society of Japan, 1 paper

The 54th Annual Meeting of the Society of Materials Science, 1 paper

The 54th Symposium Macromolecules, 1 paper

The 49th Japan Congress on Material Research, 1 paper

The 7th Riken Symposium, 1 paper

The 14th Annual Meeting of the Society of Packaging Science and Technology Japan, 1 paper

A-3. Off-campus activities

Membership in academic societies

Matsumoto, T.: The Cellulose Society of Japan (councilor), The Society of Materials Science, Japan (divisional chairman)

Yamauchi, T.: The Japan Technical Association of Pulp and Paper Industry (committee member for wood science and technology), The society of Japan Packaging Science and Technology (councilor)

Tatsumi, D.: The Cellulose Society of Japan (branch councilor), The Society of Materials Science, Japan (editorial board, divisional committee member)

Research grants

Matsumoto, T.: Scientific Basic Research (B), Elucidation of the diversity of cellulose molecules on biological origins and the advanced application of it (head: Matsumoto, coworker: Tatsumi)

Tatsumi, D.: Young Scientists (B), Prediction of viscoelastic properties of 3D fiber network structures

A-4. International cooperations and overseas activities

International meetings (roles)

Yamauchi, T.: International Symposium on Wood Science and Technology 2005, Yokohama, (Presentation)

Tatsumi, D.: The 4th Pacific Rim Conference on Rheology, Shanghai, China (Presentation)

Tatsumi, D.: The 2005 International Chemical Congress of Pacific Basin Societies, Honolulu,

Hawaii (Presentation)

Tatsumi, D.: International Symposium on Wood Science and Technology 2005, Yokohama, (Presentation)

B. Educational Activities (2005.4-2006.3)

B-1. On-campus teaching

a) Courses given

Undergraduate level: Forest and Biomaterials Science II (Matsumoto), Biophysical Chemistry (Matsumoto), Physical Properties of Polymers (Matsumoto), Pulp and Paper (Yamauchi), Information Technology in Forest and Biomaterials Science (Tatsumi), Laboratory Course in Forest and Biomaterials Science II (Yamauchi, Tatsumi), Laboratory Course in the Basic Forest and Biomaterials Chemistry (Yamauchi, Tatsumi), Laboratory Course in the Biomaterials Chemistry II (Matsumoto, Yamauchi, Tatsumi), Seminar in Forest and Biomaterials Science (Matsumoto, Yamauchi, Tatsumi)

Graduate level: Fibrous Biomaterials I (Matsumoto), Seminars in Fibrous Biomaterials (Matsumoto, Yamauchi, Tatsumi), Laboratory Course in Fibrous Biomaterials (Matsumoto, Yamauchi, Tatsumi)

B-2. Off Campus teaching, etc.

Part-time lecturer

Matsumoto, T.: Physical Chemistry, Kyoto Sangyo Univ.

C. Other Remarks

Yamauchi, T: Representative of "Paper Science Forum"

Committee Member of JSPS (Japan Society for the Promotion of Science)

Chair of Biomaterials Function

2.2.11 Laboratory of Tree Cell Biology

Staff *Professor* : *Fujita, Minoru, Dr. Agric. Sci.*
Associate Professor: *Takabe, Keiji, Dr. Agric. Sci.*
Assistant Professor : *Yoshinaga, Arata, Dr. Agric. Sci.*
Assistant Professor : *Awano, Tatsuya, Dr. Agric. Sci.*
Students and research fellows
Doctor's program : *(2)*
Master's program : *(8)*
Undergraduate : *(5)*

A. Research Activities (2005.4-2006.3)

A-1. Main subjects

a) Formation and ultrastructure of plant cell walls

Many subjects on the formation and ultrastructure of plant cell walls were investigated as the basic studies on plant materials. Immuno-electron microscopic methods were applied to the investigations of cell wall formation in *Populus*, *Eucalyptus* and softwood species. Deposition and arrangement of cellulose microfibrils in differentiating fibers in Eucalyptus were studied by using a newly equipped apparatus for freeze fracture. Formation of cellulose microfibrils by Acetobactor in mediums containing xylan, mannan and pectin, and their crystalline structures were studied by using a transmission electron microscope, FT-IR and NMR. Immunocytochemistry revealed the distribution of enzymes involved in lignin biosynthesis. It also showed the deposition process and distribution of hemicelluloses and lignins.

b) Diversity of wood structure and the quantitative evaluation

Structures and properties of woods considerably vary between and within species. In order to use wood effectively, variations in structures and properties should be characterized in detail and evaluated quantitatively. Then, the variations are ordered on several levels such as macro, micro and chemical levels, and analyzed by proper methods. For instance, quantitative evaluation of wood cell structures became possible by the image processing, especially by the Fourier transform and soft X-ray and cell shaped and arrangements were analyzed. Also minute shape changes in the wood drying were evaluated by the method : Three dimensional graphics were applied to the investigation of vessels and cellular structure of wood during differentiation. As to the chemical components of the cell wall, particularly characteristics of lignin composition and its variation among cellular elements were examined by the combination of the microscopic spectrophotometry, chemical analysis and immunocytochemistry.

c) Structural studies on the formation , physiology and functions of the cells in vascular bundles in plants. Structures and behaviors of cell organellae, stored substances and walls in xylem and phloem cells are investigated mainly in trees, bamboos and grass in relation to their development, physiological events and functions. As a study on cambial activity, the seasonal variation of cell productions was investigated on dipterocarp trees grown in Thailand and Malaysia using a

nailing method.

A-2. Publications and presentations

a) Publications

Original papers

Ogata Y, Fujita M : Z-axis calibration in optical sectioning from xylem cross sections for grain angle measurement. IAWA Journal, 26(4),427-442 (2005)

Ogata Y, Fujita M : New anatomical method of grain angles measurement using confocal microscopy and image cross-correlation. Trees-Structure and Function, 19 (1), 73-80 (2005)

Zhang C, Fujita M, Takabe K : Comparison of contact and non-contact wood fibers in some hardwoods. IAWA Journal, 26(4), 457-468 (2005)

Takeuchi M, Takabe K, Fujita M : Immunolocalization of an anionic peroxidase in differentiating poplar xylem. J. Wood Sci., 51(4), 317-322 (2005)

Veenin T, Fujita M, Nobuchi T, Siripatanadilok S : Radial variations of anatomical characteristics and specific gravity in Eucalyptus camaldulensis clones. IAWA Journal, 26(3), 353-361 (2005)

Midorikawa Y, Fujita M : Transverse shape analysis of xylem ground tissues by the Fourier transform image analysis III. Shape reconstruction of earlywood tracheids in 22 species and some parameters for normalizing cell shapes (in Japanese). Mokuzai Gakkaishi, 51 (4), 218-226 (2005)

Midorikawa Y, Ishida Y, Fujita M : Transverse shape analysis of xylem ground tissues by Fourier Transform image analysis I : Traial for statistical expression of cell arrangements with fluctuation. J Wood Sci., 51, 201-208 (2005)

Midorikawa Y, Fujita M : Transverse shape analysis of xylem ground tissues by Fourier Transform image analysis II: Cell wall directions and reconstruction of cell shapes. J Wood Sci., 51, 209-217 (2005)

Takabe K : Cambial activities of wood formation (in Japanese). Mokuzai Gakkaishi, 51 (1), 4-6 (2005)

b) Conference and seminar papers presented

The 55th Annual Meeting of the Japan Wood Research Society :6 papers

A-3. Off-campus activities

Membership in academic societies (roles)

Fujita, M.: International Academy of Wood Science (fellow).

Takabe, K.: International Academy of Wood Science (fellow).

Research grants

The Japan Society for the Promotion of Science Research Grants : Grant in Aid for fundamental Research (A): Ecological wood anatomy of tropical trees (Fujita), Grant in Aid for fundamental Research (B): Silica deposition on rice husk and better utilization of rice husk ash using thermal treatment (Fujita), Grant in Aid for fundamental Research (A) : Production of artificial cell wall by simulating lignified cell wall formation (Takabe), Grant in Aid for fundamental Research (B) : Biosynthesis and transportation system of monolignols (Takabe), Grant in Aid for fundamental Research (C) : Preparation of

monoclonal antibody against lignin (Yoshinaga)

A-4. International cooperation and overseas activities

International meetings (roles)

Takabe: WURC (Wood Ultrastructure Research Centre) International Seminar in Uppsala, Sweden (Invited speaker).

International Joint Reserches

Awano : Using transgenic trees to elucidate the function of hemicelluloses (Sweden)

Yoshinaga : Tension wood formation in transgenic trees with altered lignin metabolism (France)

Acceptance of foreign researcher

Foreign visiting scientist (1)　(Sweden, Wood Ultrastructure Research Centre)

B. Educational Activities (2005.4-2006.3)

B-1. On-Campus teaching

a)　Courses given

Undergraduate level: Basic Forest and Biomaterials Science I (Fujita), Structural and Physiological Biology of Woody Plant Cells (Fujita, Takabe), Formation of Plant Cell Walls (Takabe), Laboratory Course in Forest and Biomaterials Science (Takabe, Yoshinaga, Awano), Laboratory Course in Ultrastructural Observation of Wood (Takabe, Yoshinaga, Awano), Practice in University Forests I (Fujita, Takabe), Seminar in Forest and Biomaterials Science (Fujita, Takabe)

Graduate level: Tree Cell Biology I (Fujita), Seminor on Tree Cell Biology (Fujita, Takabe), Laboratory Course in Tree Cell Biology (Fujita, Takabe).

B-2. Off-Campus teaching

Part-time lecturer

Fujita, M: Faculty of Agriculture,Tokyo University of Agriculture and Technology (Structure of Wood)

Fujita, M: Faculty of Agriculture, Kyoto Prefectural University (Structure of Wood)

2.2.12 Laboratory of Chemistry of Composite Materials

Staff *Professor : Nishio, Yoshiyuki, Dr. Eng. Sci.*
Lecturer : Yoshioka, Mariko, Dr. Agrc. Sci.
Students and research fellows
Doctor's program: (2)
Master's program: (7)
Undergraduate : (4)

A. Research Activities (2005.4-2006.3)

A-1. Main subjects

The major specialization of this laboratory is the chemical conversion of renewable natural resources such as wood and its constituents (cellulose, lignin, etc.), starch, chitin, lipids, and so forth into useful materials possessing adequate conformity with the environment and/or specific functions in some advanced applications. Various kinds of chemical techniques are employed, including interfacial reactions in bulk, solvolysis, molecular modifications, and microscopic hybridization with supplementary compounds, to design and fabricate new types of biodegradable polymers and composites, liquid crystals, and intellectual polymer networks, and so on.

a) Thermoplasticization and Liquefaction of Wood, its Constituents, and Related Biomasses

Wood can be converted to a thermally flowable material directly by chemical modifications in various structural levels, which may be termed "internal plasticization" of wood. In some cases, the thermoplastic property can be attained by blending the modified wood with supplementary plasticizers. By virtue of such plasticizing techniques, we can design and fabricate a variety of wood-based, melt-moldable composites, applicable to many articles of daily use, housing materials, and so on. Wood can also be liquefied through reaction and solvolysis in phenols or polyhydric alcohols. In addition to fundamental studies to elucidate the liquefaction mechanism, we are making efforts to apply the high reactivity of the liquefied wood and ingredients, e.g., to preparations of composites for adhesives, molding materials, and foams, which are desirable to be environmentally friendly or biodegradable in view of practical uses. Studies directed towards utilization of other biomasses along the above-mentioned line are also in progress.

b) New Functionalization of Polysaccharides and Related Natural Compounds

Naturally occurring polysaccharides represented by cellulose and chitin, and a polyphenol lignin have been re-evaluated recently as renewable organic resources. They are environmentally benign substances and possess a high potential to be newly developed for industrial and medical applications in themselves or in combination with various synthetic compounds. Our current research is concerned with utilization of the inexhaustible natural polymers as new functional chemicals or high-performance materials. Efforts are also devoted to elucidating several fundamental problems on the molecular and supramolecular structures and physical properties of carbohydrate polymers and related natural compounds. Of particular interest are (1) the microscopic incorporation (including graft-copolymerization) of cellulose and chitin with other polymers or inorganic substances, (2) the liquid crystallinity and chiroptical properties of cellulose and chitin derivatives, (3) the complex formation and crosslinking or gelation behavior of electrolytic carbohydrate polymers and lignin derivatives, and (4) the

molecular assembly of cholesterol-based lipids, each directed toward the design and fabrication of novel and useful functional materials.

A-2. Publications and presentations

a) Publications

Original papers

Takahiro Ohno, Sachiko Yoshizawa, Yoshiharu Miyashita, and Yoshiyuki Nishio: Interaction and Scale of Mixing in Cellulose Acetate/Poly(N-vinyl pyrrolidone-co-vinyl avetate) Blends. Cellulose, **12**, 281-291 (2005)

Yoshikuni Teramoto, Tomoya Miyata, and Yoshiyuki Nishio: Dual Mesomorphic Assemblage of Chitin Normal Acylates and Rapid Enthalpy Relaxation of Their Side Chains. Biomacromolecules, **7** (1), 190-198 (2006)

Takahiro Ohno and Yoshiyuki Nishio: Cellulose Alkyl Ester/Vinyl Polymer Blends: Effects of Butyryl Substitution and Intramolecular Copolymer Composition on the Miscibility. Cellulose, **13**, 245-259 (2006)

Mariko Yoshioka, Keiji Takabe, Junji Sugiyama, Yoshiyuki Nishio: Newly developed nanocomposites from cellulose acetate/layered silicate/poly (ε- caprolactone): synthesis and morphological characterization. Journal of Wood Science, On-line First (2006)

Books

Mariko Yoshioka: "Amazing stories of wood", The Japan Wood Research Society ed., Part 1 17. High performance and high functional materials from wood liquefied !, Kodansha Ltd., Tokyo, 46-47 (2005)

Mariko Yoshioka: "Developments and applications of environmentally friendly composites", Supervisors; Toru Fujii, Takashi Nishino, Koichi Goda, Tadashi Okamoto, Chapter 2, Section 2, Plasticization and liquefaction of wood, CMC Pub., Tokyo, 86-101 (2005)

Mariko Yoshioka: "Handbook of rheology data", The Society of Rheology, Japan ed., Chapter 4, 5-4 Composites of biomass/polylactic acid, Maruzen Co., Ltd., Tokyo, 254-257 (2006)

Reviews

Takahiro Ohno, Yoshiharu Miyashita, and Yoshiyuki Nishio: Cellulose Alkyl Ester/Polymer Blends: Miscibility and Intermolecular Interactions, *Polymer Applications (Kobunshi Kako)*, **54**(6), 243-248 (2005)

M. Yoshioka: The reviews of the 7th meeting on wood-plastics composites (1. The background and present situation concerning preparation of a draft of JIS for "wood-plastics composites", and the activities of speaker's company, 2. The development of wood-plastics composites and their application to interior building materials, 3. The development of wood-based composite material "orange wood"), *Wood Industry*, **60** (8), 382-384, 2005

b) Conference and seminar papers presented

The 54th Annual Meeting of the Society of Polymer Science, Japan (Yokohama), 4 papers

The 12th Annual Meeting of the Cellulose Society of Japan (Fukuoka), 4 papers

The 54th Symposium of the Society of Polymer Science, Japan (Yamagata), 1 paper

The 50th Lignin Symposium (Nagoya), 1 paper

The 14th Polymer Materials Forum (Tokyo), 1 paper (invited)

The 19th Symposium on Green Chemistry, the Society of Polymer Science, Japan (Tokyo), 1 paper (invited)

The 231st American Chemical Society, National Meeting (Atlanta), 1 paper (invited)

2005 International Chemical Congress of Pacific Basin Societies (PACIFICHEM) (Honolulu), 3 papers (2 invited)

Japanese-European Workshop on Cellulose and Functional Polysaccharides 2005 (Vienna), 1 paper (invited)

A-3. Off-campus activities

Membership in academic societies (roles)

Nishio, Y.: The Cellulose Society of Japan (Member of Board of Directors), The Society of Polymer Science, Japan (Assoc. Editor of *Polymer Journal*), The Society of Fiber Science and Technology, Japan (Councilor), Wood Technological Association of Japan; Research Group of Wood/Plastics Composites (Member of Advisory Board)

Yoshioka, M.: The Japan Wood Research Society (Member of Editorial Board, Member of Publicity and Information Committee, Member of Committee for Considering the Future of The Japan Wood Research Society), The Society of Materials Science, Japan (Organizer of Polymer Materials Section Committee), Wood Technological Association of Japan (Office Member of Research Group of Wood/Plastics Composite Materials, Organizer of Research Group of plywood), The Society of Polymer Science, Japan (Member of Steering Committee for Research Group of Ecological Materials)

Research grants

Monbu-Kagakusho/JSPS Research Grants:

Nishio, Y.: Grant-in-Aid for Scientific Research (B), Ion-aided Dynamic Control of Mesoscopic Structure and Functions of Polysaccharides (Head investigator)

Others:

Nishio, Y.: Trust Research via NEDO/Toray Co., 1) Fundamental Analysis and Estimation of Thermally Moldable and Drawable Cellulosic Materials; 2) Molecular Orientation Analysis for Cellulosic Materials on Stretching; 3) Spatiotemporal Control of Biodegradation of Cellulose-based Microcompositional Materials (Head investigator)

Yoshioka, M: Trust Research via the Ministry of Agriculture, Forestry and Fisheries of Japan and the Ministry of Economy, Trade and Industry/ Agrifuture Joetsu Co. (1) Development of nanocomposites from plant-based polyurethane and plant-based phenolic resin; (2) Utilization of waste biomass by using the plasticization method of oligoesterification.

A-4. International cooperations and overseas activities

International cooperations

Nishio, Y.: Member of Editorial Board of the Journal "*Cellulose*"

International meetings (roles)

Nishio, Y.: The 2005 International Chemical Congress of Pacific Basin Societies (PACIFICHEM 2005), Organizer of Cellulose Session and Staff of Program Committee; Japanese-European Workshop on Cellulose and Functional Polysaccharides, Member of Organizing Committee; International Cellulose Conference 2007 (ICC 2007 Tokyo), Member of Organizing Committee

B. Educational Activities (2005.4-2006.3)

B-1. On-campus teaching

a) Courses given

Undergraduate level: Forest and Biomaterials Science II (Nishio), Chemistry of Polymer Synthesis (Nishio), Materials Chemistry of Biomass Composites (Yoshioka), Laboratory Course in Forest and Biomaterials Science II (in part; Nishio, Yoshioka), Laboratory Course in the Basic Forest and Biomaterial Chemistry (in part; Nishio, Yoshioka), Laboratory Course in the Biomaterials Chemistry II (in Part; Nishio, Yoshioka).

Graduate level: Chemistry of Composite Materials II (Nishio), Laboratory Course in Chemistry of Composite Materials (Nishio, Yoshioka), Seminar in Chemistry of Composite Materials (Nishio, Yoshioka),

B-2. Off-campus teaching, etc.

Part-time lecturer

Nishio, Y.: The University of Tokyo (Special Lecture of Biomass Chemistry)

Nishio, Y.: Kyoto Prefectural University (Lecture on Physical Properties of Polymers)

Open seminar

C. Other Remarks

Nishio, Y.: Committee Member of JSPS (Japan Society for the Promotion of Science)

Yoshioka, M.: NEDO (New Energy and Industrial Technology Development Organization) advisory panel on Technology

2.2.13 Laboratory of The Chemistry of Biomaterials

Staff *Professor* *: Nakatsubo, Fumiaki, Dr. Agric. Sci.*

Associate Professor: Takano, Toshiyuki, Dr.Agric.Sci.

Instructor *: Kamitakahara, Hiroshi, Dr. Agric. Sci.*

Students and research fellows

Doctor's Program : (1)

Master's Program: (7)

Undergraduate : (4)

A. Research Activities (2005.4-2006.3)

A-1. Main subjects

a) Chemical syntheses of natural polysaccharides and their function

We already succeeded in the first chemical synthesis of cellulose (β-1,4 glucan) by the ring-opening polymerization of the glucose orthoester derivative. Using this method, a basic research concerning the relationship between chemical structure and its property in commercial cellulose derivatives, synthesis of β-1,6 glucan, and trying to make a photo-induced electron

transfer material are now studying. And, synthesis of the cellulose derivatve which has a hydrophobic group at the reducing-end unit, synthesis of a chitosan-like polysaccharide by microwave heating, and synthesis of a regio-selective substituted cellulose using ionic liquid which is a new cellulose solvent, are also investigating.

b) Elucidation of chemical structure of total lignin in wood

The determination of chemical structure of lignin is not completed yet, although many researchers have studied over 100 years. We are studying about the novel lignin degradation method named TIZ method for the analysis of chemical structure of the total lignin in woods. We are trying to clear Lignin-Carbohydrate-Complex (LCC) by the enzyme treatment of MWL extractive residue. The information by these studies will be applied to the development of the novel high-yield pulping method. The dehydrogenative polymerization of γ-substituted monolignol derivatives are also studying to give new functional synthetic lignin.

c) Chemical syntheses of the extractive in tropical wood species and their utilization

We are studying the extractives from the root of *Rubiaceae*. The chemical synthesis of the extractive by microwave heating and its color development are investigating. And preparation of condensed-tannin from taxifolin, which is one of the components in heart wood of Larix species, and evaluation of its anti-oxidant property are also studying.

A-2. Publications and presentations

a) Publications

Books

Takano T.: Ki no bikkuribanashi 100 (The Japan wood research society ed.), P154-155, Koudansha, 2005.

Nakatsubo F.: Ki no bikkuribanashi 100 (The Japan wood research society ed.), P214-215, Koudansha, 2005.

Nakatsubo F.: Handbook of Wood Science (Okabe K. and Sobue N. ed.) P81-94, Asakura shoten, 2006.

Original papers

Nasuno T., Takano T., Kamitakahara H., Nakatsubo F.: Preparation of acetoacetylated wood meal and its properties. Part 2. Copper ion fixation by acetoacetylation. Holtzforschung 60(2), 206-209, 2006.

Nasuno T., Takano T., Yoshimura Y., Kamitakahara H., Nakatsubo F.: Preparation of acetoacetylated wood meal and its properties. Part 1. Preparation of parameter and preliminary evaluation of the antifungal activity. Holtzforschung 60(2), 201-205, 2006.

Tsuduki M., Takano T., Nakatsubo F., Yoshida K., Shinmyo A., Asao H.: Resistance to insects in ransgenic Solanum plants expressing a peroxidase gene from horseradish. Plant Biotechnology 23(1), 71-74, 2006.

Takano T, Kondo T., Nakatsubo F. Facile synthesis of rubiadin by microwave heating. Journal of Wood Science 52(1) 90-92, 2006.

Nishio N., Takano T., Kamitakahara H., Nakatsubo F.: Preparation of regioselectively mono-substituted carboxymethylcelluloses. Cellulose Chemistry and Technology 39 (5-6) 377-387, 2005.

Ifuku S., Tsujii Y., Kamitakahara H., Takano T., Nakatsubo F.: Preparation and characterization of redox cellulose Langmuir-Blodgett films containing a ferrocene derivative. Journal of

Polymer Science, Part A: Polymer Chemistry 43(21) 5023-5031, 2005.

Kamitakahara H., Enomoto Y., Hasegawa C., Nakatsubo F.: Synthesis of diblock copolymer with cellulose derivatives.2. Characterization and thermal properties of cellulose triacetate-block-oligoamide-15. Cellulose 12(5) 527-541, 2005.

Ifuku S., Kamitakahara H., Takano T., Tsujii Y., Nakatsubo F.: Preparation and characterization of 6-O-(4-stearyloxytrityl)cellulose acetate Langmuir-Blodgett films. Cellulose 12(4) 361-369, 2005.

Renbutsu E., Hirose M., Omura Y., Nakatsubo F., Okamura Y., Okamoto Y., Saimoto H., Shigemasa Y., Minami S.: Preparation and biocompatibility of novel uv-curable chitosan derivatives. Biomacromolecules 6(5) 2385-2388, 2005.

Patent

PCT/JP2005/012127 "Cello-oligosaccharides and their manufacturing" inventor and patentee: Kamitakahara, H., patentee: Kamitakahara, H., Nakatsubo, F., Klemm, D.

Report

Article

Kamitakahara, H., Enomoto, Y., Nakatsubo, F.: Synthesis of cellulosic block copolymer and its property, Cellulose Communications 12(4) 174-178, 2005.

b) Conference and seminar papers presented

The 12th Annual Meeting of the Cellulose Society of Japan (Fukuoka, 2005.7.21-7.22), 5 papers

Japanese-European Workshop on Cellulose and Functional Polysaccharides, Viena, Austria (2005.9.11-9.14), 4 papers (including a invited paper)

The 50th Lignin Symposium (Nagoya, 2005.10.19-10.20) 1 paper

International symposium on Wood Science and Technology, Yokohama, Japan. (2005.11.27-11.30), 4 papers

Pacifichem 2005, Honolulu, U.S.A (2005.12.15-12.25), 2 paper (including a invited paper)

A-3. Off-campus activities

Membership in academic societies (roles)

Nakatsubo, F.: The Japan Wood Research Society (A member of Education-promotion committee); The Cellulose Society of Japan (President); The Society of Fiber Science and Technology, Japan (Kansai Regional Board), Wood Technical Association of Japan (Councilor), International Academy of Wood Science (Fellow), Cellulose (Editorial committee), J. Wood Chem. Technol. (Editorial committee).

Takano, T.; The Japan Wood Research Society (Editorial committee).

Research grant

Monkasho Research Grant:

Nakatsubo, F.: Basic Research (B) (2) General "Molecular design of the photo-induced electron transfer super material from cellulose and its development for utilization" (Nakatsubo: head, Takano, Kamitakahara: coworker).

Kamitakahara, H.: Young Scientists (B) "The syntheses of block-like cell-oligosaccharides by the combination of ring-openning polymerization and glycosylation."

Kamitakahara, H.: Sekisui Chemical Grant Program for Research Projects Based on Learning from Nature; Encouragement prize "Creation of block copolymers based on bark components fixation cellulose learning from the self-defense mechanism of trees."

A-4. International cooperations and overseas activities

International meetings

Nakatsubo, F.: Japanese-European Workshop on Cellulose and Functional Polysaccharides, Viena, Austria (2005.9.11-9.14) (invited, Banquet speaker).

Nakatsubo, F.: Pacifichem 2005, Honolulu, U.S.A (2005.12.15-12.25) (invited)

International joint research, overseas research surveys

Nakatsubo, F.: Survey for original species of persimmon in China (Kunming) (2005.11.24-11.27)

B. Educational Activities (2005.4-2006.3)

B-1. On-campus teaching

a) Courses given

Undergraduate level: Basic Forest and Biomaterials Sciences II (Nakatsubo), Cellulose Chemistry (Nakatsubo), Biomass Chemistry (Takano), Laboratory Course in Forest and Biomaterials Science II (Takano, Kamitakahara), Laboratory Course in the Basic Forest and Biomaterial Chemistry (Takano, Kamitakahara), Laboratory Course in Biomaterials Chemistry I (Takano, Kamitakahara)

Graduate level: Biomaterials Chemistry I (Nakatsubo), Scientific writing and presentation in English (Takano), Seminar in Biomaterials Chemistry (Nakatsubo, Takano, Kamitakahara), Laboratory Course in Biomaterials Chemistry (Nakatsubo, Takano, Kamitakahara)

B-2. Off-campus teaching, etc.

Part-time lecturer

Open seminar

Kamitakahara H. “Synthesis of cellulosic block copolymer and its property,” Lecture in 248thmeeting of The society of Materials Science, Kyoto (2005.6.01).

Kamitakahara H., “Studying from defensive mechanism of tree -Preparation of thin-film of bark component immobilized cellulosic block copolymer,” Lecture in 3rd Sekisui Chemical Co. forum (2005.10.12).

Kamitakahara H., “Manufacturing of cello-oligosaccharide surfactants,” ITO fair of Kyoto University (2005.11.16).

2.2.14 Laboratory of Forest Information

Staff *Professor* : *Takeuchi, Michiyuki, Dr. Agric. Sci.*
Associate Professor: *Shiba, Masami, Dr. Agric. Sci.*
Lecturer : *Nishimura, Kazuo, Dr. Agric. Sci.*
Lecturer : *Nakashima, Tadashi, Dr. Agric. Sci.*
Assistant Professor : *Sakanoue, Nao, Dr. Agric. Sci.*

Students and research fellows
Doctor's program : (1)
Master's program : (4)
Undergraduate : (2)
Research student: (1)

A. Research Activities (2005.4-2006.3)

A-1. Main subjects

Dealing with the sophistical issues of integrating forest resources management with environmental, and social values and objectives in a sustainable manners requires a more holistic and spatial approaches than has been traditionally applied to managing forest ecosystem condition at a stand level. By taking a landscape perspective, combined with improved analytical tools to support the consensus-based management decision-making, benchmarking forest management practices to meet the adequate scale or level of potential impacts caused by silvicultural and harvesting activities might be realized. The importance of the precise evaluation and monitoring for forest, changing with long-term cycle, therefore, is increasing. Our laboratory, based on FSERC's research & experimental forests, demonstrate the long-term conservation outlook of forest resources under alternative management strategies geared to multiple economic, environmental, and social issues as follows;

a) Long rotation forest management schemes and adaptive management technology for plantation forestry in Japan,
b) Study on water environment, soil production and plant-related substance-cycling,
c) Timber production, processing and trade strategies,
d) Site-specific functional categorization and zonation of forest area,
e) Optimization of forest road network infrastructure,
f) Forest resource monitoring system based on GIS/image processing,
g) Strategies for forest certification and timber logistics, and
h) Operational efficiency and LCA/RM approaches for mechanized timber harvesting

A-2. Publications and presentations

a) Publications

Original papers

Shiba, M. and Itaya, A.: Using eCognition for improved forest management and monitoring

systems in precision forestry. Proc. of the international Precision Forestry Symposium: 351-359. 2006

Itaya, A. and Shiba, M.: Using eCognition for estimation of operational site units in forestry - scheme and application of method of analysis -. The Japan Forest Engineering Society 20(4): 299-303. 2006 (in Japanese with English summary)

Shiba, M.: Compatibility of Forest Certification and Forest Harvesting Practice Code Approach to Sustainable Forest Management. Journal of Japan Forest Society 87(4): 358-363, 2005 (in Japanese with English summary)

Shiba, M.: Effects of forest certification approaches on management strategies of plantation forests in Japan: opportunities or constrains? Research: A critical partner in forest certification. The International Forestry Review. 7(5): 193-194. 2005

Shiba, M.: A GIS-based interactive spatial decision support system for integrating the management of protection and production forests, Protection forests: recognizing and maintaining the forest influence with regards by hydrogeomorphic processes. The International Forestry Review. 7(5): 313. 2005

Shiba, M.: Status quo of forestry production circumstances in Japan and new trends of wood logistics based upon the international forest certification and CoC-labeling schemes. Proceeding of Seminar on the Sustainable Management and Utilization of Japanese Cedar, Korea Forest Research Institute (KFRI) – Warm-Temperate Forest Research Center, Seogwipo, Korea: 40-74. 2005

Shiba, M.: A GIS-based interactive spatial decision support system for SFM-oriented timber harvest scheduling/allocation strategies in plantation forests. Proceeding Council on Forest Engineering 28th Annual Meeting, Fortuna, CA USA: 61-73. 2005

Shiba, M., Ishikawa, T. and Ishidoh,Y.: Timber harvest scheduling and allocation model for simulation long rotation plantation forest management system. J. JFES, Vol.19(4); 309-314, 2005 (in Japanese with English summary)

Shiba,M. and Ishikawa, T.: Some considerations on a timber harvest scheduling/allocation model THSAM. Transactions of the 116th Annual Meeting of the JFS;4B02, 2005 (in Japanese)

Ris Hadi, P. and Shiba, M.: Allometric equations for estimating above ground biomass and leaf area of planted teak (*Tectona grandis*) forests under agroforestry management in East Java, Indonesia. FOREST RESEARCH, KYOTO 76: 1-8. 2005

Reports

Shiba, M.: Adaptive forest management system for SFM-oriented timber harvest strategies in Japanese plantations. Final reports for the 2005-2006 research project, Grant-in Aid for Scientific Research: Scientific Research (C)(2); 1-81, 2006(in Japanese)

Shiba, M.: Forest and wood industry in sustainable society. Seminar report for the cellulose society of Kansai branch; 1-10, 2005 (in Japanese)

Shiba, M.: Development of a forest management certification and a chain of custody scheme oriented towards Japanese plantation forestry. Mid-term research report for research grant from scientific and cultural promotion foundation of Asahi Breweries Ltd;1-132, 2005 (in Japanese)

b) Conference and seminar papers presented

Annual Meeting of Japan Forest Society: (5)

Annual Meeting of The Japan Forest Engineering Society: (2)

Annual Branch Meeting of Japan Forest Society: (3)
International society meeting/world conference: (5)

A-3. Off-campus activities

Membership in academic societies

FSC-Japan establishment secretariat (Shiba, Organizer), Kansai Branch of Japanese Forest Society (Shiba,Editorial board member)

Research grants

Monbukagakusyo Research Grant: Grant-in-Aid for Scientific Research (A) (1); Study on the procurement of vegetable materials for repair of wooden constructions as cultural property. (Sakanoue, Co-researcher)

JSPS Research Grant: Grant-in-Aid for Scientific Research (C) (2); Development of adaptive forest management system (AFMS) oriented towards the sustainable forest management for Japanese plantation forests. (Shiba, head)

Other Research Grant: Research grant from scientific and cultural promotion foundation of Asahi Breweries Ltd "Development of a forest management certification and a chain of custody scheme oriented towards Japanese plantation forestry" (Shiba).

A-4. International cooperations and overseas activities

International meetings (roles)

Shiba, M.: Council on Forest Engineering 28th Annual Meeting, Fortuna, CA U (Chairman/ presenter), XXII IUFRO World Congress, Brisbane Australia (Chairman/presenter), Seminar on the Sustainable Management and Utilization of Japanese Cedar, Korea Forest Research Institute (KFRI) – Warm-Temperate Forest Research Center, Seogwipo, Korea (Special lecture)

International academic society and/or organizational officers

Shiba, M.: IUFRO S3.06 Coordinator, IUFRO S3.06.02 Duty coordinator, International Editorial Board for International Journal of Forest Engineering, USA, International Member of Council on Forest Engineering, USA, FSC International (Japanese member), ISTVS (Japanese member), FSC forest certifiers (Japanese adjudicator)

B. Educational Activities (2005.4-2006.3)

B-1. On-campus teaching

a) Courses given

Undergraduate level: Basic Science for Forest and Biomaterials Ⅳ (Takeuchi), Forest Management System & Applied Technology (Shiba), Fundamental of Glaciology (Takeuchi, Nakashima), Practice Course in Forest Science Ⅳ (Shiba, Sakanoue), Integrated Practice and its Method on Forest Science (Shiba, Sakanoue), Practice in University Forest I (Takeuchi, Nakashima), Practice in University Forest Ⅲ (Sakanoue)

Graduate level: Special lecture on Forest Information Science Ⅱ (Shiba), Special lecture on Forest Information Science (Takeuchi), Laboratory course in forest information (Takeuchi)

B-2. Off-campus teaching, etc.

Part-time lecturer

Shiba, M.: Graduate school of Bioagricultural Science, Nagoya University(Special lecture on biosphere resource management), Faculty of Agriculture, Ryukyu University (Special lecture on forest utilization technology), Faculty of Agriculture, Ehime University (Forest operational environment)

Open seminar

Takeuchi, M., Nakashima, K., Nishimura, K., Sakanoue, N., Shiba, M.: Kyoto Univ. For., Open Seminar, Structure and function of Forests (Lecturer)

Shiba, M.: (NPO) Senior nature university, Open Seminar, Global environment and ecosystems (Lecturer)

Shiba, M.: The cellulose society of Kansai branch; Forest and wood industry in sustainable society (Lecturer)

C. Other remarks

Shiba, M.: Mie Prefecture Environmental Conservation Agency (Technical advisor), Mie Biotope Research Association (Councilor), World Wide Found For Nature, Japan (Council member of forest management system), Forest Planning Division, Mie Prefecture (Council member of developing perspective forest management strategies in Miyakawa watershed area in Mie), TOMIMURA Environment Research Institute (Technical advisor), AMITA Corporation (Technical advisor), SGS Japan (Technical advisor for forest certification)

2.2.15 Laboratory of Silviculture

Staff *Associate Professor: Ando, Makoto, Dr. Agric. Sci.*
Associate Professor: Shibata, Shozo, Dr. Agric. Sci.
Associate Professor: Tokuchi, Naoko, Dr. Agric. Sci.
Assistant Professor : Sakimoto, Michinori, Dr. Agric. Sci.

Students and research fellows
Doctor's program:(7)
Master's program:(6)
Undergraduate :(1)

A. Research Activities (2005.4-2006.3)

A-1. Main subjects

a) Nitrogen cycling

Nitrogen is the limiting factor for plant growth. N dynamics is important for forest, especially in plant-soil system. Nitrogen dynamics is described the typical Japanese vegetation which belongs to Field Science and Education Center, Kyoto University.

b) Studies on dynamics, maintenance mechanisms of biological diversity, and life historical strategies of plant species in forests.

Natural forests are heterogeneous in time and space, and are composed of various many plant species. Those plant species have their own specific life history strategies. To develop the methods foe ecological management and conservation of forests, we are engaged in analyzing spatial structure, dynamics mechanisms of diversity, and reproductive ecology and demography of plant species in natural forests.

A-2. Publications and presentations

a) Publications

Books

Shibata S.: *Satoyama*. Encyclopedia of Environmental restoration (Ed. Japanese Society of Revegetation Technology), 323-330, Asakura-Shoten, Tokyo, 2005 (in Japanese)

Original papers

Ogawa, N., Fukamachi, K., Oku, K,. Shibata, S. and Morimoto, Y.: Study on transition and succession of village ladscape of *Sasabuki* in the Tango Peninsula, Landscape Research Japan. Landscape Research 68(5); 627-632, 2005 (in Japanese)

Abe, Y., Shibata, S., Nakanishi, A. and Osawa, N.: Seed bank and seed rain of woody species in a *Chamaecyparis obtusa* dominated suburban secondary forest. J. Jpn. Soc. Revegetation Society 31(1); 3-8, 2005 (in Japanese)

Shibata, S.: Tree growth and its evaluation in ecological revegetation sites in Japan, Proc. 1st Intl. Symposium on Landscape and Ecological Engineering; 37-51, 2005

Kosugi, Y.・Tanaka, H.・Takanashi, S.・Matsuo, N.・Ohte, N.・Shibata, S.and Tani, M.: Three years of carbon and energy fluxes from Japanese evergreen broad-leaved forest, Agricultural & Forest Meteorology 132; 329-343, 2005

Osawa, N.・Terai, A.・Hirata, K.・Nakanishi, A.・Makino, A.・Sakai, S.and Shibata S.: Logging impacts on forest carabid assemblages in Japan, Canadian J. of For. Res. 35; 2698-2708, 2005

Sasaki, Y., Shibata, S. and Morimoto, Y.: The prediction and healthiness of plant species structure of coastal vegetation on semi-natural and artificial coasts of the Seto Inland Sea. J. Jpn. Soc. Revegetation Society 31(3); 364-372, 2006 (in Japanese)

Ishimaru, K., Tokuchi, N., Osawa, N., Kawamura, K. and Takeda, H. (2005) Behavior of four broad-leaved tree species used to revegetate eroded granite hill slopes. Journal of Forest Research. 10: 27-34

Hobara, S., Koba, K., Osono, T., Tokuchi, N., Ishida, A. and Kameda, K. (2005) Nitrogen and phosphorus enrichment and balance in forests colonized by cormorants: Implications of the influence of soil adsorption. Plant and Soil 268: 89-101

Purwanto, R. H. and N.Tokuchi (2005) Production and seasonal patterns of leaf litter in moist deciduous forests in eastern Java, Indonesia. Tropics 14: 371-376

Reviews

Shibata, S: Restoration of *Satoyama* and bamboo forest. Textbook for the Harris Forum of Doshisya University; 29-38, 2005 (in Japanese)

Reports

Vegetation Sub-Group: Effect of climate changes on the species composition and productivity of

plant communities in the eastern Mediterranean region of Turkey. The Progress Report of ICCAP, the Research Project on the Impact of Climate Change on Agricultural Production System in Arid Area(ICCAP) , 7, 71-72, 2005

Tamai S., Ando M. and Sano J.: Stand structure and characteristics of tree growth in plant communities of the eastern Mediterranean region, Turkey. 7, 73-75, 2005

Sano J., Kato K., TAMAI S. and Ando M.: Effects of Climate Changes on the Species Composition and Vegetation Productivity in Arid Areas –Present patterns and future prospects for potential vegetation in the Eastern Mediterranean Region of Turkey-. Proceeding of the International Workshop for the Research Project on the Impact of Climate Change on Agricultural Production System in Arid Area (ICCAP), 8, 31-34, 2006

Sano Junji, Tamai S., Ando M. and Kato K.: Effects of Climate Change on the Species Composition and Vegetation Productivity in Arid Areas - Species Composition and Distributional Patterns of Predominant Tree Species in the Eastern Mediterranean Region of Turkey -. 2nd EAFES International Congress Book of Abstracts, 2, 499, 2006

Go H., Okada H., Shimizu Y. and Ando M.: Effect of ground treatment on the growth of one year Japanese red pine seedlings. Trans. 117th Mtg. Jpn. For. Soc., PA47, 2006

Ando, M.: Report of vegetation research of forest around Hacchou-daira swamp, 2005. Kyoto City, 1-34, 2006

Shibata, S.: Bamboo resources in Vietnam and its propagation methods, GSGES Asia Platform (Annual Report 2005); 27-29, 2006

Shibata, S., Abe, Y. and Okamoto,S: Expansion of bamboo forest in Tennnozan. Trans. 117th Mtg. Jpn. For. Soc., 2006 (in Japanese)

Nakanishi, A., Inagaki, Y., Kuramoto, M., Shibata, S., Fukada, H. and Osawa, N.: Factors influenced to the male flower production of *Chamaecyparis obtusa*. Trans. 117th Mtg. Jpn. For. Soc., 2006 (in Japanese)

Abe, Y. and Shibata, S.: Gregarious flowering of *Sasa hirsta* in Kyoto city. Trans. 117th Mtg. Jpn. For. Soc., 2006 (in Japanese)

Ikeda, K., Kanzaki, M. and Shibata, S.: Vegetation recovery process of *Melocanna baccifera* dominated fallow farmlands in North-east India. Trans. 117th Mtg. Jpn. For. Soc., 2006 (in Japanese)

b) Conference and seminar papers presented

Ando: Forest Society of Japan (1), EAFES International Congress (1)

Shibata: Japanese Institute of Landscape Architecture(1), Japanese Society of Revegetation Technology (1), Forest Society of Japan (4)

Tokuchi: Forest Society of Japan (3), Ecological Society of Japan (5), Acid Rain (3)

A-3. Off-campus activities

Membership in academic societies

Shibata, S.: Jpn. Inst. Landscape Architecture (Director, Associate chairman of special journal, Review committee member), Jpn. Soc. Revegetation Technol. (Director, Chairman of environmental forest section, Chairman of editorial boards, Member for the selection of award, International community commity member)

Tokuchi, N.: Ecological Society of Japan

Membership in Science Council of Japan, etc.

Shibata, S.: Jpn. Bamboo Soc. (Councilor, Editorial member), Soc. Study of Bamboo (Rep.), Center for Support of Forest regeneration (Councilor), Foundation for the promotion of bamboo culture (Councilor), Consortium for Bamboo Resources Effective Uses (Advisor), Consortium for green purchase (Advisor), CDM Network in Osaka (Advisor)

Research grants

Ando, M.: Kyoto City grant: Vegetation research of forest around Hacchou-daira swamp, 2005 (Ando rep.), Grant-in Aid for Scientific Research: Basic Research(C); Recovery of the forest landscape behind world's cultural heritage in Kyoto(Ando rep.)

Shibata, S.: Grant-in Aid for Scientific Research: Basic Research (A) (1); Development of HEP in ecosystem mitigation (Shibata part.), Grant-in Aid for Scientific Research: Basic Research (A) (1); Ecological study of gregarious flowering of bamboo, *Melocanna baccifera* in North-east India (Shibata rep.), Grant-in Aid for Scientific Research: Basic Research (B) (1); Solution and application of regional recovery mechanism in the middle Vietnam (Shibata part.)

Tokuchi, N.: Grant-in Aid for Scientific Research: Basic Research (B) (2); Carbon and nitrogen fixing mechanism and estimation of potential pool (Tokuchi rep.), Grant-in Aid for Scientific Research: Basic Research (B) (2); Evaluation method for forest environment change by modeling of formation mechanism of stream-water chemistry (Tokuchi part.), Grant-in Aid for Scientific Research: Basic Research (A) (1); Long-term monitoring and large scale observation of water, heat and nutrient in stream ecosystem (Tokuchi part.), Grant-in Aid for Scientific Research: Basic Research (B); The interaction between forest structure development and nitrogen dynamics in Siberia (Tokuchi part), Ministry of Environment; Nitrogen dynamics in Larix ecosystem (Tokuchi part), Shiga prefecture grant; Evaluation of forest environment change by forest management (Tokuchi part.), Stream Foundation; The influences of stream water amount and chemistry by forest management (Tokuchi rep.)

A-4. International cooperations and overseas activities

International meetings (roles)

Shibata, S.: Opening workshop on disaster, environment and people, Hue, Vietnam (presentation), 1st International Symposium on Landscape and Ecological Engineering, Seoul. Korea (presentation), Workshop on Education and research cooperation on environment and disaster management for human security, Hue, Vietnam (presentation)

Tokuchi, N.: International Meeting of East Asia Lonf Term Ecological Reserch (committee, presentation)

Membership in international academic societies

Shibata S.: International Consortium of Landscape and Ecological Engineering (Associate Editor-in-Chief of journal, Secretary-general of international conference in 2006), World Bamboo Organization (Board member)

International joint researches, overseas research surveys

Ando, M.: Impact of Climate Change on Agricultural Production System in the Arid Areas (Turkey)

Shibata, S.: Survey of *Melocanna baccifera* forests (India), Arrangement of the site in natural

history museum, Tribhuvan Univ. (Nepal), Survey for research of traditional techniques against the disaster (Vietnam)

Tokuchi, N: Nitrogen dynamics in Larix ecosystem (Russia), Nitrogen dynamics after forest fire (US)

Scholars from abroad

3 persons (Cukurova University, Turkey 2 professors, Mustafa Kendal University, Turkey, lecture)

B. Educational Activities (2005.4-2006.3)

B-1. On-campus teaching

a) Courses given

Undergraduate level: Exercises in Ecological Interactions between Forest and Coastal Area III (Tokuchi), Exercises in Ecological Interactions between Forest and Coastal Area II (Ando), Laboratory Course in Applied Forest and Biomaterials Science (Ando), Basic Science for Forest and Biomaterials IV (Ando), Regeneration and Dynamics of Forests (Ando), Silviculture (Tokuchi), Forest Botany (Ando), Science of Biosphere – life, food and environment (Ando and Tokuchi), Practice of University Forest III (Ando), Practice of University Forest IV (Ando), Planting design for landscaping (Shibata & Morimoto), What the woods give us (Tokuchi)

Graduate level: Seminar in Silviculture (Ando, Shibata, Tokuchi, and Sakimoto), Practice Course in Silviculture (Ando, Shibata, Tokuchi, and Sakimoto), Landscape ecology and planning (Morimoto & Shibata), Regeneration of woodland in countryside (Shibata), Practice of field works in forests (Shibata), Silviculture II (Ando)

B-2. Off-campus teaching, etc.

Part-time lecturer

Shibata, S.: Kyoto Junior College of Art (Revegetation Technology), Kyoto College of Art (Correspondence course, Landscape Design and Nature conservation)

Tokuchi, N.: Kyoto Prefectural University (Forest Ecosystem Ecology), Senier Nature University (Nutrient Cycling)

Open seminar, etc

Ando, M.: "Activity of silviculture for bringing up pure water" Promoting on Activity of Local Policy, Department of Economics, Kushiro Branch (lecturer)

Shibata, S.: Workshop of folklore and natural studies (lecturer), Workshop of Japan Bamboo Society (lecturer), Workshop of "children village" (lecturer), Workshop of "Shimadai-juku", GES, Kyoto univ. (lecturer), Preparing meeting of Kinki Consortium of Bamboo resource Effective Uses (keynote speech), Lecture course of Association of Natural Environment conservation of Osaka Pref. (lecturer), Management course of Kohko-en garden in Himeji (lecturer), Symposium of bamboo forest conference in Tnn-nozan (lecturer), Harris forum of Doshisya University (lecturer), Nature Forum of Osaka Office, Ministry of Environment (lecturer), Lecture course of Institute of environment conservation (lecturer), 6th Younger Forum, Japan Bamboo Association (coordinator), Lecture meeting of Japan Bamboo Association in 2005 (lecturer), Management course of man-made slope revegetation (lecturer), Lecture course of Awaji Landscape Planning and Horticulture

Academy (lecturer), Study course of Toyonaka citizens' environmental meeting (lecturer), Study course of natural conservation strategy (lecturer), Kyoto Landscape Architecture Association (lecturer)

Sakimoto, M.: Open Seminar of Kamigamo Experimental Forest, Kyoto University (lecturer)

C. Other remarks

Foreign student: 1 master's course student (China)

Shibata, S.: Member of working group for preservation of wall paintings in Takamatsuzuka tomb (Agency for Cultural Affairs), Green Management Technical Com. (Ministry of Infrastructure and Transport), Member of political discussion committee for Green Public Project (Kyoto Pref.), Member of committee for conservation of nature in Ide (Ide Town), Chairman of committee for the improvement of forest path in Tango Peninsula (Kyoto Pref.), Member of committee for the preservation and application of cultural landscape of Kitayama forestry landscape (Agency of Cultural Affairs), Member of committee for evaluation of research project (Insitute of Forest and Forestry study, Kansai Branch), Project leader of CENEED (Centre for Nepal of Environmental and Educational Development) Supporting Group

TV interview of TV Osaka concerning the growth of bamboo shoots

Radio interview of NHK concerning the new bamboo uses

Magazine Interview of Kansai Electric Company

Chair of Wood Biomass Science

2.2.16 Laboratory of Biomass Morphogenesis and Information (Research Institute for Sustainable Humanosphere)

Staff *Professor: Sugiyama, Junji, Dr. Agric. Sci.*

Assistant Professor: Baba, Kei'ichi, Dr. Agric. Sci.

Students and research fellows

Doctor's program : (1)

Master's program : (2)

Postdoctoral Fellow : (2)

Research Staff : (1)

A. Research Activities (2005.4-2006.3)

A-1. Main subjects

a) Structure and Function of Cell Wall

Structure and organization of cell wall during evolution of living organism, three-dimensional organization of cell wall components, biogenesis and orientation-control mechanism of cellulose microfibrils are now being studied by using the following methods: electron microscopy,

immunology, molecular biology, and polysaccharide analysis.

b) Crystal structure of cellulose and its variation from the view point of biological diversity

Native celluloses yield two types of crystal structure, namely monoclinic and triclinic crystal forms, whose ratio varies depending on cellulose origins. The objectives are to determine their structures as well as to relate the cause of structural variation with factors such as evolution, biogenesis and the crystallization mechanism, environment and so on.

c) Physiology of Growth in Forest Trees

Trees are distinguished from herbs or grasses by their longer life, larger size and slower maturity. Physiological mechanisms characterizing trees are studied by the methods on anatomy, histochemistry, cytochemistry, biochemistry and molecular biology. Now, we are targeting the response of xylem differentiating tissue against inclination stimulus and formation of tension wood.

d) Tree Species of Excavated Wood and Relevant Environment

Japan is characterized by wooden culture and many wooden articles have been used for living from ancient time. However, the materialized data to demonstrate those mentioned above are lacking. We are now studying the tree species and uses of wood excavated from the relics in our country in relation to the region and era. We are also aiming to reconstruct the forest around the ancient relics.

A-2. Publications and presentations

a) Publications

Books

Original papers

Yoshioka Y, Takabe K, Sugiyama J, Nishio Y: Newly developed nanocomposites from cellulose acetate/poly-ε-caprolactone/layered silicate I: synthesis and morphological characterization. J Wood Sci 52, 121-127, 2006

Ding S-Y, Smith S, Xu Q, Sugiyama J, Jones M, Rumbles G, Bayer EA, Himmel ME: Ordered arrays of quantum dots using cellulosomal proteins. Industrial biotechnol 1, 198-206, 2006

Kim N-H, Imai T, Wada M, Sugiyama J : Molecular directionality in cellulose polymorphs . Biomacromolecules 7 , 274-280 , 2006

Matthews JF, Skopec CE, Mason PE, Succato P, Torget RW, Sugiyama J, Himmel ME, Brady JW: Computer simulations of water structuring adjacent to microcrystalline cellulose Iß structure. Carbohydr Res 341, 138-152, 2006

Clair B, Gril J, Baba K, Thibaut B, Sugiyama J: Precautions for the structural analysis of the gelatinous layer in tension wood. IAWA J 26 , 189-195, 2005

Nakamura I, Yoneda H, Maeda T, Makino A, Ohmae M, Sugiyama J, Ueda M, Kobayashi S, Kimura S: Enzymatic polymerization behavior using cellulose-binding domain deficient endoglucanase II. Macromol Biosci 5, 623-628 , 2005

Kamiyama T, Suzuki H, Sugiyama J : Studies of the structural change during deformation in Cryptomeria japonica by time-resolved synchrotron small-angle X-ray scattering. J Struct Biol 151, 1-11, 2005

Clair B, Thibaut B, Sugiyama J : On the detachment of gelatinous layer in tension wood fibre . J Wood Sci 51, 218 - 221, 2005

Hult E-L, Katouno F, Uchiyama T, Watanabe T, Sugiyama J: Molecular directionality in crystalline ß-chitin: hydrolysis by chitinases A and B from Serratia marcescens 2170. Biochem J 388, 851-856, 2005

T. Hayashi, K. Yoshida, Y. W. Park, T. Konishi, K. Baba: Cellulose Metabolism in Plants. Internatl. Rev. Cytol., 247, 1-34, 2005

Reports

Hayashi, T., Baba, K.: Function analysis of cellulose and xyloglucan by over-expression of hydrolases against polysaccharides. Regulation of Plant Growth and Development, 40 (2) 167-174, 2005

S. Sakai, T. Nishide, E. Munir, K. Baba, H. Inui, Y. Nakano, T. Hattori, M. Shimada: Subcellular localizations of glyoxalate cycle key enzymes involved in oxalate biosynthesis of wood destroying basidiomycete Formitopsis palustris grown on glucose. In Towards Ecology and Economy Harmonization of Tropical Forest Resources, ed. W. Dwianto, pp. 411-417, 2005

b) Conference and seminar papers presented

47th Annual meeting of Japan Society of Plant Physiologist (2)

12th Annual meeting of the Cellulose Society of Japan (4)

Chitin Chitosan Symposium (1)

A-3. Off-campus activities

Membership in academic societies

Itoh Takao:Cellulose society of Japan (Council), The Japanese Society of Microscopy (Council), Japan Wood Research Society (Editor)

Sugiyama Junji: Cellulose society of Japan (Executive board, branch head, Editor), The Japanese Society of Microsocpy (Council, Regional manager, Regional Council), Japan Wood Research Society (member of future planning committee, public information committee)

Membership in Science Council of Japan, etc.

Research grants

Sugiyama Junji: Grant-in-Aid for scientific Research (C) Mechanical optimization of trees in relation with ultrastructure (coordinator)

Sugiyama Junji: Grant-in-Aid for scientific Research (JSPS fellow: Thi Thi NGE) Development of chitin-based biomimetic composite material (coordinator)

Baba Kei'ichi: Program of Basic Research Activities for Innovative Biosciences (PROBRAIN), "Functions and control of polysaccharides in plant cell wall" (share)

A-4. International cooperations and overseas activities

International meetings (roles)

Sugiyama, J.: Gordon Research Conference (polysaccharides, on the chemistry of) (modelator)

Sugiyama, J.: Japanese–European Workshop „Cellulose / Functionals polysaccharides (invited)

Sugiyama, J. : International Wood Science Symporium, Bali (oral)

Sugiyama, J.: International Association of Wood Products Societies (oral)

Sugiyama, J.: Pacifichem 2005 (invited)

Itoh, T.: 6th International Wood Anatomy Conference, Kyoto (president)

Sugiyama, J.: 6th International Wood Anatomy Conference, Kyoto (poster, organising committee

member)

Baba, K.: 6th International Wood Anatomy Conference, Kyoto (organising committee member)

Baba, K.: International Association of Wood Products Societies (oral)

Membership in international academic societies

Sugiyama, J.: American Chemical Society, cellulose and renewable materials division(program committee), Cellulose (editorial board)

International joint researches, overseas research surveys

Itoh, T.: Studies on wood culture in East Asia, from the aspects of tree species used for wooden sculptures and excavated wood

Itoh, T.: Bio-diversity of Chinese wood

Sugiyama J.: Hierarchical structural analysis of wood cell wall (Germany and U.K.)

Scholars from abroad

2 JSPS postdoctoral fellows

1 Invited foreign researcher

2 foreign cooperative researchers

B. Educational Activities (2005.4-2006.3)

B-1. On-campus teaching

a) Courses given

Junior Campus: Open Campus for junior high school students (Sugiyama)

Undergraduate level:

Graduate level: Graduate school of Agriculture (Sugiyama)

B-2. Off-campus teaching, etc.

Part-time lecturer

Nara Institute for Cultural properties (Itoh)

Symposium of Sakuramachi Historic Site (Itoh)

B-3. Overseas teaching

Seminar

Itoh, T.: Nanjing Forestry University, Nanjing, China

Itoh, T.: Peking University, Beijing, China

Itoh, T.: Chinese Academy of Forestry, Wood Industry Institute, Beijing, China

C. Other remarks

Itoh, T.: Committee member for JSPS Postdoctoral fellows

Itoh, T.: Committee member of Research Center for Buried Cultural Properties

Itoh, T.: a member for Invention Evaluation Committee at Yoshida Base

Sugiyama, J.: Committee member for public information

Sugiyama, J.: Committee member for the home page administration

2.2.17 Laboratory of Active Bio-based Materials (Research Institute for Sustainable Humanosphere)

Staff *Professor* : *Yano, Hiroyuki*
Associate Professor : Morooka, Toshiro
Associate Professor : Tanaka, Fumio
Students and research fellow
Post doctoral research fellow: (1)
Doctor's program : (2)
Master's program : (3)
Research Student: (1)

A. Research Activities (2005.4-2006.3)

A-1. Main subjects

a) Development of cellulose nanocomposites
b) Production of high performance materials based on bacterial cellulose
c) Studies on compressive deformation of resin impregnated wood
d) Adhesives and molded products made from *acacia mangium* and radiata pine bark or their extractives
e) Total utilization of *acacia mangium*
f) Utilization of cellulose nanofiber for organic electronic devices
g) Investigation of mechanism of compressive deformation of wood and its permanent fixation
Processing technique such as wood bending, compressive wood, surface compression wood using softening properties of wood are developed.
h) Studies on house climate
Regulation mechanism of temperature and humidity in wooden house is investigated.
i) Molecular design of high-performance polysaccharides
New high-performance materials based on polysaccharide derivatives are designed using molecular simulation technique.

A-2. Publications and presentations

a) Publications

Books

Yano, H. and A.N. Nakagaito: Cellulose nanofiber composites, Developments and Applications of Environmentally Friendly Composites, p.65-73, CMC publishing, Tokyo, 2005

Yano, H.: Wood based-materials as strong as steel, p.50-51, Kodansha, Tokyo, 2005

Morooka, T.: Collected work using superheated steam, p. 95-104, NTS publishing, Tokyo, 2006

Original papers

Shams, M.I.and H.Yano: Compressive deformation of wood impregnated with low molecular weight phenol formaldehyde (PF) resinⅢ. J. Wood Sci., **51**(3); 234-238, 2005

Iwamoto S., H. Yano, A. N. Nakagaito and M. Nogi: Optically transparent composites reinforced with plant fiber-based nanofibers. Applied Physics A, **81**(6); 1109-1112, 2005

Nogi M., A. N. Nakagaito and H. Yano: Nondependency of optical transparency of bio-nanofiber

composites on the refractive index of their polymeric matrixes. Applied Physics. Letters, **87**, 243110, 2005

Tanaka, F. and K. Okamura: Characterization of cellulose molecules in bio-system studied by modeling methods. Cellulose, **12**; 243-252, 2005

Shams, M.I., K. Kagemori and H.Yano: Compressive deformation of wood impregnated with low molecular weight phenol formaldehyde (PF) resin Ⅳ Species dependency. J. Wood Science, **52**(2); 179-183, 2006

Shams, M.I., T. Morooka and H.Yano: Compressive deformation of wood impregnated with low molecular weight phenol formaldehyde (PF) resin Ⅴ Effects of steaming pretreatment. J. Wood Science, in press

Nogi, M., K. Handa, A. N. Nakagaito, and H. Yano: Optically transparent bionanofiber composites with low sensitivity to refractive index of the polymer matrix. Applied Physics. Letters, **87**; 1, 2005

Nogi, M., S. Ifuku, K. Abe, K. Handa, A. N. Nakagaito and H. Yano: Fiber-content dependency of the optical transparency and thermal expansion of bacterial nanofiber reinforced composites. Applied Physics Letters, **88**; 133124, 2006

Reviews

Yano, H.: Wood Physics Past, present and future, Mokuzai Gakkaishi, **51**(1); 13-15, 2005

Yano, H., S. Kawai, S. Ogawa, J. Inai, Y. Honma, H.Yamauchi, H. Nasu, M. Yamazaki and M. Yada: Production of Tannin high content acacia bark powder and its utilization for adhesives, Wood Industry, **60**(10); 478-482, 2005

Yano, H., M. Nogi, K. Handa and H. Kubota: Utilization of bacterial cellulose for the substrate of organic EL display, Bioscience and Industry, **63**(11); 28-29, 2005

Yano, H.: Bio-nanofiber: The potential of cellulose microfibril as a nanofiber, Cellulose Communications, **12**(2); 63-68, 2005

Yano, H.: High strength nanocomposites reinforced by cellulose nanofiber, Research Journal of Food and Agriculture, **28**(10); 20-24, 2005

Yano, H.: Future nanocomposites using cellulose nanofiber as a reinforcement, Web Journal, **No.73**; 14-17, 2005

Yano, H., K. Handa and T. Miyadera: Development of organic EL(OLED) flexible display, Journal of Society of Automotive Engineering of Japan, **60**(5); 102-105(2006)

Reports

Yano, H., S. Kawai, S. Ogawa, J. Inai, Y. Honma, H. Yamauchi, H. Nasu, M. Yamazaki and M. Yada: RISH Project report 2004 for low environmental impact housing, Production of thick and low density Japanese cedar plywood using Acacia mangium bark powder mixed adhesives, p.73-80, 2005

Tanaka, F. and K. Okamura: Characterization of cellulose molecules in bio- system studied by modeling methods. Proceedings of the 22nd International Carbohydrate Symposium, at Glasgow, Scotland, 23 - 27, July, 2004

Morooka, T.: New method for estimating humidity control capacity of materials. Special reports of RISH project (Mission 4), Uji, 29, February, 2006

Asada, T. and T. Morooka: On the moisture content of wood high temperatures. Proceedings of the 6th International Wood Science Symposium, at Bali, Indonesia, 29 - 31, July, 2005

Morooka, T.: Drying stress and its mechanism under superheated steam, Special reports of

FFPRI project, Tsukuba, Jan, 2006

Artcles, News paper and TV program

Yano, H., T, Morooka and F. Tanaka: Introduction of the activities at Laboratory of Active Bio-based Materials, RISH, Kyoto University, Journal of Japanese Society of Plastic Processing, 17(3); 180-182, 2005

Yano, H.: Bi-obased materials for the IT application, Ginkou Club, No.483; 2-3, 2005

Yano, H.: Development of flexible substrate using bacterial cellulose, 2005 October 17th, Nikkei Business Daily.

Yano, H.: Development of flexible substrate using bacterial cellulose, May 27th, 2005 MBS, News program, "Voice".

b) Conference and seminar papers presented

6th International Wood Science Seminar (3 presentations, Yano, H. and Morooka, T.)

International Symposium on Wood Science and Technology (6 presentations, Yano, H.)

Gordon Conference (1 presentation, Yano, H.)

The First International Symposium of Research Center for Environment Friendly Polymers (IS-RCEFP-I) (1 presentation Tanaka, F.)

12th Annual meeting of cellulose society of Japan (3 presentations, Yano, H., Morooka, T. and Tanaka F.)

The 49th Japan materials reaserch union meeting (1 presentation, Yano, H.)

A-3. Off-campus activities

Membership in academic societies

Yano, H.: Member of The Japan Wood Research Society, The Wood Technological Association of Japan, Member of The Society of Materials Science, Member of the Cellulose Society of Japan

Morooka, T.: Member of The Japan Wood Research Society, Member of The Society of Materials Science, Japan, Member of the Society of Rheology, Japan

Fumio, F.: Member of The Society of Polymer Science, Japan, Member of he Crystallographic Society of Japan, Member of The Papanese Society of Carbohydrate Research, Member of The Society of Fiber Science and Technology, Japan, Member of The Society of Cyclodextrins, Japan, Member of Society of Computer Chemistry, Japan, Member of The Cellulose Sociaty of Japan

Research grants

Yano, H.: Grant-in-Aid for Scientific Research (B) (2), Injection moldings of microfibrillated cellulose reinforced bio-plastic (Head Investigator)

Grant-in-Aid for Scientific Research (Tokubetsu Kenkyuin Shorei-hi), Development of MFC/Bio-plastic compounds using twin screw extruder

Grant-in-Aid for regional consortium for research and development, Production of biomass-originated nanofiber and development of high plant resource content composites (Head Investigator)

Morooka, T.: Grant for a project for high speed drying of sugi from Forestry and Forest Product Research Institute (Head Investigator)

A-4. International cooperations and overseas activities

International joint researches, overseas research surveys

Yano, H.: Total Utilization of *Acacia Mangium* (Indonesia, JSPS core university program)

International Conference and Symposium (roll)

Yano, H.: Gordon Conference, HongKong, China (Invited speaker) (2005.06.05-2005.06.10)

Yano, H.: IBC International Botanical Congress, Vienna, Oesterreich (Invited speaker) (2005.07.18)

Yano, H.: Kyoto International Forum for Environment and Energy, KIFEE WorkShop, Kyoto (Invited speaker) (2005.10.5-7)

Yano, H.: Harima International Forum, Hyogo (Invited speaker) (2006.01.27)

Scholars from abroad

4 Invited Scholars

1 JSPS postdoctoral fellow

B. Educational Activities (2005.4-2006.3)

B-1. On-campus teaching

a) Courses given

Undergraduate level: Wood Composite Products (Yano)

Graduate level: Wood polymer (Yano, Morooka, Tanaka), Wood science and technology seminar (Yano, Morooka, Tanaka), Laboratory course in property enhancement of wood (Yano, Morooka, Tanaka)

B-2. Off-campus teaching, etc.

Open seminar, etc

Yano, H.: Annual meeting of The Textile Machinary Society of Japan, The Textile Machinary Society of Japan (Invited), Kyoto University Uji campus festival symposium (Lecturer), Wood Science Seminar, Kansai branch of The Wood Technological Association of Japan (Lecturer), 12th annual meeting of the Cellulose Society of Japan (Lecturer), 21th Sustainable Humanosphere Symposium, RISH (Lecturer), ST/GSC road map symposium, JCII (Lecturer), Kyoto science teachers accosiation special lecture, Kyoto science teachers accosiation (Lecutrer), Special forum of The Japan Society of Mechanical Engineer, The Japan Society of Mechanical Engineer (Invited), The Scoirty of Polymer Science, Japan Tokai Symposium, The Scoirty of Polymer Science, Japan (Invited), 49th Symposium of materials science union, materials science union (Lecturer), Symposium of Japan Society of Polymer Processing, Japan Society of Polymer Processing (Lecutrer), 35th Sustainable Humanosphere Symposium, RISH (Lecturer), Bamboo Workshop, Doshisha Univeraity (Lecturer)

Part-time Lecturer

Yano, H.: Seminar on Wood Technological Institute, Akita Pref. Univ. (Lecturer) "Production of thick and low density Japanese cedar plywood using *Acacia mangium* bark powder mixed adhesives", Seminar on Wood Technological Institute, Akita Pref. Univ. (Lecturer) "Potential of cellulosic nanofiber materials", Seminar on Miyazaki Prefectural Wood Utilization Research Center "Cellulosic Nanomaterials"

Morooka, T.: Spring school for wood science in Cibinong, Indonesia (Lecturer), Seminar for House

and Materials, Kyoto Univ. (Lecturer)

B-3. Overseas teaching

Student and research fellows from abroad

Doctor's program: 1 (Bangladesh)

Research Student: 1 (Indonesia)

C. Other remarks

Yano, H.: The Cellulose Society of Japan Hayashi Jisuke Award, Development of high-performance nanocomposites based on microfibrillated cellulose. (2005.7.21, Fukuoka)

2.2.18 Laboratory of Sustainable Materials (Research Institute for Sustainable Humanosphere)

Staff *Professor* *: Kawai, Shuichi , Dr. Agric. Sci.*

Assistant Professor : Umemura, Kenji, Dr. Agric. Sci.

Students and research fellows

Doctor's program: (1) *Research fellow : (7)*

Master's program: (2) *Resercher: (1)*

A. Research Activities (2005.4-2006.3)

A-1. Main subjects

The laboratory aims to establish the sustainable cycle of forest and forest products by developing the production, utilization and recyling/desposal system of wood biomass. New wood based materials harmonized with both global and regional environment are being developed by making use of the functions of wood as a cellular solid;

The research projects are as follows:

1. Lumber Composite Products
   a) Continuous production process of cylindrical LVL by using spiral winding method.
   b) Numerical analysis of mechanical properties of cylindrical LVL and paper pipe.
   c) Prediction of mechanical properties of oriented materials from different element sizes based on fracture mechanics.
   d) Development of adhesive bonding technology of high functional materials appicable to outdoor condition
   e) Development of joint plates with compressed LVL and its application to the timber construction.
   f) Grading and fire-resistant performance of tropical fast-growing species
   g) Development of wood/bamboo nails.
   h) L or T shaped wooden connector and its structural design for furniture and the timber construction.

2. Panels Products
   a) Development of fiber reinforced composites by using plant fibers
   b) Development of binderless boards from kenaf core, etc
   c) Development of vertically oriented fiberboard from recycled materials
   d) Development of thick low-density fiberboard and its application to sandwich panels
   e) Shear performance of sandwich panels
   f) Development of straw board from non-wood lignocellulosics
3. Wood Carbon Composites
   a) Development of bamboo carbon composites
4. Densification/High-strength Wood Plastic Composites
   a) Adhesives and plastic-like molded products made from Acacia mangium bark or their extractives
   b) Transverse compression behavior of wood by roller pressing method
   c) Liquid impregnation and dehydration by large transverse compression of wood
   d) Replacement of free water with treatment liquid by roller-pressing method
   e) Development of thermoplastic materials using natural polymer
   f) Principle, manufacture and utilization of compressed wood
   g) Compression behavior of bamboo
   h) High-strength wood plastic composites from bamboo fiber
5. Mineral Bonded Composites
   a) High-strength and light-weight cement bonded particleboards from kenaf bast-fiber and core particles
   b) Rapid curing technology of cement bonded particleboard
   c) High-performance gypsum bonded particleboard
6. Adhesive Resins/ Durability of Adhesion
   a) Durability of isocyanate resin adhesives
   b) Development of chitosan based adhesives
   c) Characterization of bonding mechanism of binderless board and its application to wood adhesives
   d) Development and utilization of lignin binder
   e) Production of high durable wood adhesives from bark of fast growing trees
7. Fire retardancy/ Fire Resistance Tests
   a) Fire resistance of timber-frame Walls
8. Integrated Projects
   a) Life cycle assessment of wood composites
   b) Total processing and utilization system of domestic small-diameter low-grade logs
   c) Preservation of wooden cultural properties –thermal treatment of wood for the color and property control–
   d) Aging of wood and prediction of service life of wood
   e) Paleobotanical study on the fossil woods from the tertiary in Asia –a case study of the silicified woods from java island, Indonesia–
   f) Sustainable cycle of forest and forest products on humanosphere

A-2. Publications and presentations

a) Publications

Original Papers

Kouji Adachi, Masafumi Inoue, Schuichi Kawai: Liquid Impregnation of Green Wood using a Roller-Pressing Method. Mokuzai Gakkaishi, 51(3), 159-165 (2005)

Kouji Adachi, Masafumi Inoue, Schuichi Kawai: Defromation Behavior of Wood by Roller Pressing. Mokuzai Gakkaishi, 51(4), 234-242 (2005)

Takumi Fujita, Naotoshi Komatsu, Shuichi Kawai: Manufacture and Properties of Gypsum-Bonded Particleboard III. Improvement of bending properties by overlaying with kenaf fiber mats and evaluation of the combustibility ob the boards. Mokuzai Gakkaishi, 51(5),318-326 (2005)

A Firmanti, E.T. Bachtiar, S Surjokusumo, K Komastu, S Kawai: Mechanical stress grading of tropical timbers without regard to species. J. Wood Science, 51(4), 339-347 (2005)

J Xu, Widyorini R, S Kawai: Properties of kenaf core binderless reinforced with kenaf bast fiber-woven sheets. J. Wood Science, 51(4), 415-420 (2005)

Kenji Umemura, Yasuo Iijima, Shuichi Kawai : Development of new natural polymer-based wood adhesives II. Effects of molecular weight and spread rate on bonding properties of chitosan. J. Adhesion Society of Japan, 2005, 41(6), 216-222.

Ragil Widyorini, Jianying Xu, Kenji Umemura, Shuichi Kawai: Manufacture and properties of binderless particleboard from bagasse I: effects of raw material type, storage methods, and manufacturing process. J. Wood Science, 51(6), 648-654 (2005)

Ragil Widyorini, Jianying Xu, Higashihara,t , Watanabe,T.; Kawai,S :Self-bonding characteristics of binderless kenaf core composites. Wood Sci Technol (2005) 39: 651-662

Reviews

S. Kawai: Towards the sustainable utilization of domestic logs –Round-table meeting on the utilization of domestic logs for the sound forests and the review on the projects of 50th anniversary of Japan Wood Research Soceity, Sanrin, No,1449, 2-8, 2005

Reports

Kawai, S: Recent Development of Wood Composites in Japan-Towards the Sustainable Utilization of Forest Resources-, Proc.IAWPS2005, Vol.1, p.106-107, 27-29 Nov.2005, Yokohama.

Dede, Hermawan; Yusuf, Sudo, Hadi; Kawai, S: THE UTILIZATION OF CORE-KENAF PARTICLES AS AN ALTERNATIVE TO WOODCHIP, Proc.IAWPS2005, Vol.2, p.19, 27-29 Nov.2005, Yokohama.

Yokoyama, M.; Itoh, T.; Kawai, S.: Evaluation of wood:comparison between an accelerated aging treated wood and naturally aged wood, Proc. IAWPS2005, Vol.2, p.95-96, 27-29 Nov. 2005, Yokohama.

Anita Firmanti; Bambang Subiyanto; Kawai, S.: Prospect of the utilization of acasia mangium for structural and non-structural building materials, Proc. IAWPS2005, Vol.2, p.121-122, 27-29 Nov.2005, Yokohama.

Pierre BERARD; Ping YANG; Yamauchi, H; Umemura, K; Kawai, S: Modelization of cylindrical LVL: and comparison with experiments to improve quality of the butt joint, Proc. IAWPS2005, Vol.2, p.167-168, 27-29 Nov.2005, Yokohama.

Ragil Widiyorini; Jianying Xu; Umemura, K.; Watanabe, T.; Kawai,S.: Self-Bonding Characterization of Non-Wood Lignocellulosic Materials, Proc. IAWPS2005, Vol.2,

p.169-170, 27-29 Nov.2005, Yokohama.

Umemura, K.; Iijima, Y.; Kawai, S.: Bonding Properties of Chitosan, Proc. IAWPS2005, Vol.2, p.223-224, 27-29 Nov.2005, Yokohama.

Norimoto, M.; Matsumoto, A.; Sasada, M.; Inoue, M.; Mori, T.; Kawai, S.: The Preparation of a High Strength Material from Bamboo Fiber Bundles, Proc. 6th International Wood Science Symposium, p7, 29-31 Aug. 2005, Bali, Indonesia.

Inoue, M.; Norimoto, M.; Kawai, S.: Bamboo Bending, Proc. 6th International Wood Science Symposium, p8, 29-31 Aug. 2005, Bali, Indonesia.

Sasa Sofyan Munawar; Umemura, K.; Kawai, S.: Characterization of the Mechanical Properties of Plant Fiber Bundles, Proc. 6th International Wood Science Symposium, p13, 29-31 Aug. 2005, Bali, Indonesia.

Yokoyama, M.; Yano, K.; Fujiwara, Y.; Kishimoto, Y.; Fujii, Y.; Kawai, S. : Evaluation of the Aging of Wood as Perceived by Japanese Sculptors of Buddhist Statues, Proc. 6th International Wood Science Symposium, p8, 29-31 Aug. 2005, Bali, Indonesia.

Umemura, K.; Kawai, S.; Yamauchi, H.; Shibata, M.; Ito, T.: Color Change of UV Treated PMDI, Proc. 6th International Wood Science Symposium, p41, 29-31 Aug. 2005, Bali, Indonesia.

Tanaka, E.; Anita Firmanti; Kawai, S.: A Case Study on the Carbon Flow Analysis in Large-scale Plantation Forest of Acacia mangium, Proc. 6th International Wood Science Symposium, p448, 29-31 Aug. 2005, Bali, Indonesia.

Anita Firmanti; Kawai, S. : A Series of Studies on the Utilization of Acacia mangium Timber as Structural Materials, Proc. 6th International Wood Science Symposium, p463, 29-31 Aug. 2005, Bali, Indonesia.

Umemura, K.; Kawai, S.: Bonding Properties of Konjac glucomannan and Chitosan Composites, Biographies & Abstracts, Wood Adhesives 2005, P19, 2-4 Nov. 2005, San Diego, USA.

Yokoyama, M.; Sorimachi, H.; Kubodera, S.; Kawai, S.; Itoh, T.: Wood Identification of Japanese traditional buildings in Kyoto, 6th Pacific Regional Wood Anatomy Conference, December 2005, Kyoto, Japan.

b) Conference and seminar papers presented

IAWPS (Yokohama, 7 presentations, Kawai S, Umemura K)

6th IWSS (Kyoto, 5 presentations, Kawai S., Umemura K)

49th JSMS Annual Meetings (1 presentation, Kawai S.)

27th Annual Meetings of the Japan Society for the Conservation of Cultural Property (1 presentation, Kawai S.)

A-3. Off-campus activities

Membership in academic societies (roles)

Kawai, S.: The Japan Wood Research Society (Member of directors board, President) The Society of Materials Science, Japan (Member of directors board, Vice-president, Members of the Committees of Wood Composite materials and Referee), The Forest, Wood, and Environment Academy ((Member of directors board, Member of Steering Committee), The Wood Technological Association of Japan (Member of directors board, Chief Secretary of the Kansai Branch), The Japan Wood Preserving Association (Head of LCA Committee), The Adhesion Society of Japan (Secretary of the Committee of Wood-Composites). Member of the Committees of Wood Research Field, Science Council

of Japan.

Umemura, K.: The Wood Technological Association of Japan (Planning Committee of the Kansai Branch, Secretary of the Committee of Plywood), The Adhesion Society of Japan (Secretary of the Committee of Wood-Composites), The Society of Materials Science, Japan (Secretary of research party on wood-based materials).

Research grants

Kawai, S.: Project of Ministry of Agri., Forestry and Fichery, Tech. Development of eco-system in rural area for 21century (Fellows)

Kawai, S.: Grants-in-Aid for Scientific Research: Service life of wood members: Investigation with the samples from histrical wooden buildings and cultural properties.

Kawai, S.: Grants-in-Aid for Scientific Research: Development of plant fiber-polymer composites with high-durability and low-environmental impact.

Kawai, S.: Grants-in-Aid for Scientific Research: Elucidation and prediction of aging wood.

A-4. International cooperation and overseas activities

International meetings (roles)

Kawai, S: IAWPS2005 (Plenary Session 4 Coordinator)

Umemura, K.: 6th International Wood Science Seminar (Session Chair)

International joint researches, overseas research surveys

Kawai, S.: Investigation of Ligna-Hanouver and Biomass-electric plant (Germany & Finland) Sustainable and cyclic production and utilization of wood in the field of large-scale plantation of acacia mangium (Malaysia).

International Activities

Kawai, S.: IUFRO s5.05.01 Working Group Leader, International Academy of Wood Science, Fellow

Scholars from abroad

Dr. Zhang Ming: Prof. of Nanjing Forestry University

Dr. Berard Pierre Regis: l'Université de Montpellier

Dr. Thomas Walther: Universität Hamburg

Dr. Ragil Widyorini: Gadjah Mada University

B. Educational Activities (2005.4-2006.3)

B-1. On-campus teaching

a) Courses given

Undergraduate level: Wood Composites (Kawai, Yano)

Graduate Level: Seminar in Wood Composites (Kawai, Umemura).
Laboratory Course of Wood Composites (Kawai, Umemura).
Wood Composite Products I (Kawai)

B-2. Off-campus teaching, etc.

Part-time lecturer

Kawai, S.: Sonpo-Japan Symposium on promoting the domestic timber utilization (Lecturer & Coordinator), Special seminar of the Japan Timber Market Federation (Lecturer), Seminar of the Japan Committee for promoting Timber utilization (Lecturer), The

Research Committee of Recycling technology, The Japan Fiber Res. Soc. (Lecturer), Seminar of Noshiro Youth Assoc. in Wood Industry (Lecturer), Symposium on woody life in Japan (Tokyo & Kyoto) (Lecturer & Coordinator), Symposium on promoting the domestic timber utilization (Lecturer), Res. Committee on Modern Education (Lecturer), Symposium of the director meeting of the Res. Inst. and Center in the universities (Lecturer), Symposium on promoting the domestic timber utilization (Hiroshima and Senndai) (Lecturer & Coordinator), Symposium of Centennial Anniversary of Forest and Forest Products Lab. (Lecturer), Symposium of Wood Composite Committee in Japan Wood Technological Association (Lecturer), Open Seminar of Forest Science, Kyoto University (Lecturer), Symposium of The 29th Wood Cultivation Festival (Lecturer), Seminar of the Nagoya International Wood Machinary Fair (Lecturer), Special Seminar of Poval Res. Group (Lecturer), North-East Asia Academic Forum (Lecturer), International Symposium of Sustainalbe Humanosphere (Lecturer), The 35th Humanosphere Symposium (Lecturer)

Open seminar, etc

Kawai S: 1st and 2nd Symposia of the Sustainable Humanosphere, Res. Inst for the Sustainable Humanosphere (Lecture), Symposium of Kyoto University Res. Istitutes (Lecturer).

B-3. Overseas teaching

Lectures and seminars

Kawai, S.: Special Lecture of Zhejiang Forestry College (Zhejiang, Lecturer)

Umemura, K: Special Lecture of Wood Science School in LIPI (Indonesia, Lecturer)

Students and research fellows from abroad

Foreign Special Research Fellow: 4 persons from France, Indonesia, China and Germany

Doctor course student: 1 person from Indonesia

C. Other remarks

Kawai, S.: Director of the Research Inst. for Sustainable Humanosphere, Member of education and research council, Kyoto Univ., Program officer of JSPS Research Center for Science Systems. Councilor of Forst and Forest Products Lab. Japan, Gifu Pref. Sci. and Tech. Adviser, Adviser of Okayama Pref. Wood Technology Center, Guest researcher of the Nara Pref. Forest Tech. Center.

2.2.19 Laboratory of Innovative Humano-habitability (Research Institute for Sustainable Humanosphere)

Staff *Professor* *: Imamura, Yuji, Dr. Agric. Sci.*
Associate Professor: Tsunoda, Kunio, Dr. Agric. Sci.
Associate Professor: Yoshimura, Tsuyoshi, Dr. Kyoto Univ. (Agric. Sci.)
Lecturer *: Hata, Toshimitsu, Dr. Kyoto Univ. (Agric. Sci.)*

Students and research fellows
Doctor's program *: (9)*
Master's program *: (1)*
Research fellow *: (0)*
Research student *: (0)*
Post Doctoral Fellow *: (1)*
Visiting Scientist *: (1)*
Foreign Visiting Scientist: (1)

A. Research Activities (2005.4-2006.3)

A-1. Main subjects

The laboratory aim is to establish the society with proper resource recycle system in the future humanosphere. Fundamental and innovative investigations are being conducted with emphasis on the symbiotic relations with forest and wood resources.

a) Comprehensive study on the improvement of durability of wood, wood-based materials and wooden constructions

The improvement of durability of wood and wood-based materials, and the long life-span of wooden constructions with the horizon to the environmental conservation and the prevention of the global warming.

b) Integrated termite control on the basis of fundamental research

Role of symbiotic micro-organisms in the cellulose metabolism of termite; Synthetic route of termite trail-following pheromone; Biological control of termites by entomogenous fungi; Estimation of colony size of termites and fopraging territories and application of bait system to termites.

c) Application of low-toxicity wood preservatives and novel treatment methods to the wood preservation

Development of low-toxicity wood preservatives based on laboratory screening tests of various chemicals and field evaluation; Mode of actions of wood preservatives; Detoxificating pathways of chemicals under various conditions; Application of supercritical fluid to the preservative treatment of wood and wood-based composites.

d) Durability assessment of wooden houses and development of the reliable maintenance system

Assessment of the durability of wooden houses by means of various integrated techniques including the non-destructive detection of deterioration, and development of the reliable maintenance system.

e) Improvement of properties of timbers and wood-based composites by various treatments

Development of high performance wood products by chemical modification, impregnation of

polymerizing materials and complex of wood and inorganic chemicals, as well as introduction with natural components.

f) Conservation of wooden cultural properties

Conservation technology wooden cultural properties and waterlogged wood.

g) Bioremediation by wood-relating microorganisms

Bioremediation of environment with decay fungi and termite-symbionts; biological treatments of stable waste materials and insulation materials, and development of new energy options by wood deteriorating organisms.

h) Wood deterioration in the space environment

Wood deterioration in the space environment consisting of radiations, heat cycles etc.

i) Development of advanced high functional biomass carbon materials by thermal conversion.

Based on the fundamental study on the structure of carbonized biomass, high functional carbonized materials such as SiC nanorods, nanotubes and graphite are developed with or without catalyst of SiO_2 or Al_2O_3 by thermal conversion such as pulse current sintering method or flush pyrolysis.

j) Development of purification or recycling technology from preservative treated wood waste

Development of novel technology for purification and recycling preserved wood wastes with pyrolysis or chemical extraction. Electron microscopic study is conducted for clarifying the mechanism of pyrolysis of CCA (chromium, copper and arsenic oxide)-treated wood. Selective separation of components of CCA, purification and recycling technique of preserved wood wastes.

k) Development for improving fire-resistant performance of wood composites.

Reduced scale fire resistance tests on traditional timber-frame soil walls are studied.

A-2. Publications and presentations

a) Publications

Books

Imamura, Y.: Wood, In "Durability of Polymeric and Composite Materials", Ed. by Z. Osawa, CMC Publication; p.256-264, 2005

Imamura, Y.: Wood Charcoal, In "Handbook of Porous Absorbants", Ed. by H. Yoshida, Fuji Techno System; p.49-55, 2005

Imamura, Y.: Termite Habitation Front is Advancing North, In "Amazing Hundred Stories of Wood", Ed. by Japan Wood Research Society, Koudansha; p.132-133, 2005

Yoshimura, T.: Living together with termites? In "Amazing Hundred Stories of Wood", Ed. by Japan Wood Research Society, Koudansha; p.36-37, 2005

Yoshimura, T.: Termite damages in wet-wood, In "Wood Preservation Handbook", Ed. by the Japan Wood Preserving Association, The Japan Wood Preserving Association, p.57-70, 2005

Hata, T.: State of the Art Wood Diamond, In "Amazing Hundred Stories of Wood", Ed. by Japan Wood Research Society, Koudansha; p.52-53, 2005

Kiguchi, M., Y. Kataoka, M. Suzuki and Y. Imamura: Progress Toward the Service Life Prediction of Coatings for Exterior Wood by Weathering Test Trials, In "Service Life Prediction-Challenging the Status Quo", (J. W. Martin, R. A. Ryntz and R. A. Dickie, ed.), p.123-134, Federation of Societies for Coating Technology, USA, 2005

Original papers

Tsunoda, K., Y. Hikawa, H. Matsuoka and T. Yoshimura: Field evaluation of hexaflumuron as a bait-toxicant using a transferred nest of *Coptotermes formosanus* (Isoptera: Rhinotermitidae). Jpn. J. Environ. Entomol. Zool., 16; 125-129, 2005

Hata, T., K. Ishimaru, M. Fujisawa, P. Bronsveld, T. Vystavel, J. DeHosson, H. Kikuchi, T. Nishizawa and Y. Imamura: Catalytic graphitization of wood-based carbons with alumina by pulse current heating. Fullerenes, Nanotubes, and Carbon Nanostructures, 13: 435-445, 2005

Hata, T., V. Castro, M. Fujisawa, Y. Imamura, S. Bonnamy, P. Bronsveld and H. Kikuchi, Formation of silicon carbide nanorods from wood-based carbons. Fullerenes, Nanotubes, and Carbon Nanostructures, 13:107-113, 2005

Nakayama, T., T. Yoshimura and Y. Imamura: The optimum temperature-humidity combination for the feeding activities of Japanese subterranean termites. J. Wood Sci. 50; 530-534, 2004

Hwang, W. J., S. N. Kartal K. Shinoda and Y. Imamura: Surface treatment for preventing decay and termite attack in wood using didecyl dimethyl ammonium tetrafluoroborate (DBF) incorporated with acryl-silicon type resin. Holz als Roh und Werkstoff, 63; 204-208, 2005

Fujisawa, M., T. Hata, P. Bronsveld, V. Castro, F. Tanaka, H. Kikuchi, Y. Imamura: Thermoelectric properties of SiC/C composites from wood charcoal by pulse current sintering. Journal of the European Ceramic Society, 25, 2735-2738, 2005

Okahisa, Y., T. Yoshimura, Y. Imamura, Y. Fujiwara and Y. Fujii: Potential of termite attack against Moso bamboo (*Phyllostachys pubescens* Mazel) in correlation with surface characteristics. Jpn. J. Environ. Entomol. Zool. 16; 85-89, 2005

Okahisa, Y., T. Yoshimura and Y. Imamura: An application of the alkaline-glucoamylase hydrolysis method to analyze starch and sugar contents of bamboo. J. Wood Sci. 51; 542-545, 2005

Indrayani, Y., T. Yoshimura, Y. Fujii, Y. Yanase, Y. Fujiwara, A. Adachi, S. Kawaguchi, M. Miura and Y. Imamura: A case study of *Incisitermes minor* (Isoptera: Rhinotermitidae) infestation in Wakayama Prefecture, Japan. Sociobiology 46(1); 45-64, 2005

Kawaguchi, S., H. Saito, N. Kasuya, T. Ikeda and Y. Imamura: The primary production of Tachiyanagi colonies established in the abandoned paddy fields. J. Jap. For. Res. 87; 430-434, 2005

Ohgama, T., Y. Imamura, M. Norimoto, K. Abe and H. Tatemoto: Humidity conditioning by wood charcoal. Mokuzai Gakkaishi 51; 334-339, 2005

Kartal S. N., K. Shinoda and Y. Imamura: Laboratory evaluation of boron-containing quaternary ammonia compound, didecyl dimethyl ammonium tetrafluoroborate (DBF) for inhibition of mold and stain fungi. Holz als Roh und Werkstoff, 63; 73-77, 2005

Watanabe, Y., R. Mihara, T. Matsunaga and T. Yoshimura: Termite repellent sesquiterpenoids from Callitris glaucophylla heartwood. J. Wood Sci. 51; 514-519, 2005

Kakitani, T., T. Hata, T. Kajimoto and Y. Imamura: Designing a purification process for chromium-, copper- and arsenic-contaminated wood. Waste Management, 26(5), 453-458, 2006

Kakitani, T., T. Hata, T. Kajimoto and Y. Imamura: A novel extractant for removal of hazardous metals from preservative-treated wood waste. Journal of Environmental Quality 35(3),

912-917, 2006

Bronsveld, P., T. Hata, T. Vystavel, J. DeHosson, H. Kikuchi, K. Nishimiya and Y. Imamura: Comparison between carbonization of wood charcoal with Al-triisopropoxide and alumina. Journal of the European Ceramics Society Vol.26/4-5: 719-723, 2006

Reports

Tsunoda, K.: Biological resistance of wood-based composites under aboveground conditions. The Intern, Res. Group on Wood Protection. Document No. IRG-05-20312, 2005

Tsunoda, K.: Improved management of termites to protect Japanese homes. Proc. 5th ICUP, 33-37, 2005

Yoshimura, T. and K. Tsunoda: Termite problems and management in Pacific-Rim Asian region. Proceedings of International Association of Wood Products Societies; 316-317, 2005

Yoshimura, T. and K. Tsunoda: Tunneling and survival of Japanese subterranean termites in soil treated with a nonrepellent termiticide, fipronil. Proceedings of the 3rd Conference of Pacific-Rim Termite Research Group; 75-78, 2006

Yoshimura, T. and K. Tsunoda: The evaluation of the activity of Japanese subterranean termites with monitoring stations and their control by the bait system. RISH Cooperative Seminar – Perspectives for the monitoring of inset pests; 48-52, 2006

Yoshimura, T.: The field evaluation of anti-termite metal plates. The 29th RISH Symposium – DOL/LSF Cooperative Research Projects; 58-59, 2006

Hata, T., S. Bonnamy, Y. Breton, P. Bronsveld and V. Castro: Advanced Carbon Materials from Carbonized Cedar Wood for Valorization of Wood-Based Carbons, Proceedings of the 49th Meeting of the Materials Science Group in Japan Materials Council, 499-500, 2005

Hata, T., S. Bonnamy, Y. Breton, P. Bronsveld, V. Castro, Valorization of carbonized cedar-wood as advanced carbon materials, The 1st International Conference on Carbon for Energy Storage and Environment Protection, p.101, 2005

Hata, T., K. Ishimaru, P. Bronsveld, M. Fujisawa, F. Kurosaki, H. Kikuchi and Y. Imamura, XPS and RAMAN spectroscopy on diamond/graphite composite from carbonized wood, Towards Ecology and Economy Harmonization of Tropical Forest Resources, Proceeding of the 6th International Wood Science Symposium, p.50, 2005

Hata T.: Distribution of arsenic fraction in solid residue of CCA treated wood, International Symposium on the Environmental Impacts of Preservative Treated Wood: For achieving safe and healthy environments, 5-6, 2005

Hata, T. and K. Yamamoto: Attending the 36th Annual Meeting of International Research Group on Wood Protection, Wood Preservation, Vol.31-5, p.214-218, 2005

Nakayama, T., T. Yoshimura and Y. Fujikawa: An application of the stable isotope analysis to wood preservation. Proceedings of the 6th International Wood Science Symposium; 185-188, 2005

Hwang, W-J., S. N. Kartal, Y. Imamura and K. Shinoda: Synergistic effects of heartwood extractives and preservative chemicals on termite resistance of woods with different natural durability.Proceedings of the 6th International Wood Science Symposium; 31, 2005

Katsumata, N., S. Kawaguchi, Y. Indrayani, T. Yoshimura, T. Saito ans Y. Imamura: Potential of gamma-irradiation as a termite cxontrol measure. Proceedings of the 6th International Wood Science Symposium; 29, 2005

Katsumata, N., T. Yoshimura and Y. Imamura: Enzymatic sugar conversion of gamma-irradiated wood. The 42nd Annual Meeting on Radioisotope and Radiation Research; 54, 2005

Okahisa, Y., T. Yoshimura and Y. Imamura: Seasonal and height-depending changes of starch and free glucose contents in Moso bamboo. Proceedings of the 6th International Wood Science Symposium; 55, 2005

Indrayani, Y., T. Yoshimura and Y. Imamura: Wood preference of dry-wood termite Incisitermes minor (Hagen) (Isoptera: Kalotermitidae) to Japanese and U.S. timbers. Proceedings of the 6th International Wood Science Symposium; 33, 2005

Kurosaki, F., K. Ishimaru, T. Hata, J. Sugiyama and Y. Imamura: Effect of pre-heating and flash-heating on microstructures of carbonized cellulose, Towards Ecology and Economy Harmonization of Tropical Forest Resources, Proceeding of the 6th International Wood Science Symposium, p.51, 2005

Erwin, W-J Hwang, M. Takeuchi, T. Itoh and Y. Imamura: Observations of decayed xylem of stem canker on light red meranti (*Shorea smithiana* Sym.). Proceedings of 6th Pacific Regional Wood Anatomy Conference; 36, 2005

Erwin, W-J Hwang and Y. Imamura: Analyze of the infection of canker fungi on light red Meranti (*Shorea smithiano*); A scanning electron microscopic study. Proceedings of the 6th International Wood Science Symposium; 32, 2005

Kawaguchi, S., T. Yoshimura, Y. Imamura, M. Miura, Y. Yanase, Y. Fujii, S. Okumura and K. Suzuki: Energy gas production from wood biomasses by termites -A preliminary result-. Proc. 6th International Wood Science Symposium; 198-203, 2005

Kawaguchi, S. and T. Yoshimura: The effective production of biogases with termites and their symbiotic microorganisms. The 2nd Symposium on the Sustainable Energy Recycling – Biomass conversion and SPS; 27-34, 2006

Kartal, S. N., Yasuo Sekine, Takeshi Adachi and Yuji Imamura: Resistance of wood treated with various essential oil compounds and plant extracts against fungi and termites. Proceedings of International Association of Wood Products Societies; 2005

Yanase, Y., Y. Fujii, S. Okumura, T. Yoshimura, Y. Imamura, H. Kawaguchi and T. Okumura: Feasibility of several particulate materials as a physical barrier against termites. Proceedings of the 6th International Wood Science Symposium; 160-164, 2005

Azuma, J., K. Tsunoda and T. Yoshimura: Why borates toxic to termites? The 28th RISH Symposium; 14-17, 2006

Koyanaka, H., T. Hata and Y. Imamura: Disordered manganese oxide nano-powder prepared by low-temperature synthesis and acid treatment, Bulletin of Research Institute for Sustainable Humanosphere, Kyoto University, 1, 19-21, 2005

Koyanaka, H., K. Ishimaru, T. Hata, Y. Imamura, K. Takeuchi, K. Ui, N. Koura: Wet Etching of Gold by Dilute Acid with the Application of Oxidizing Agent, Proceedings of the 72nd Autumn Meeting of the Electrochemical Society of Japan, 77, 2005

Tarakanadha, B., T. Hata, S. N. Kartal, W. J. Hwang and Y. Imamura: Removal of copper, chromium and arsenic from CCA treated wood using boron compounds, IRG/WP 05-50230, The International Research Group on Wood Protection (IRG 36) , p1-9, 2005

Kakitani, T., T. Kajimoto, T. Hata and Y. Imamura: Solvent extraction for pollution minimization of CCA-waste wood, International Symposium on the Environmental Impacts of Preservative Treated Wood: For achieving safe and healthy environments, 23-24, 2005

b) Conference and seminar papers presented

The 6th International Wood Science Symposium, Sustainable Production and Effective Utilization of Tropical Forest Resources: 6 presentations

The 6th Pacific Regional Wood Anatomy Conference: 1 presentation

International Congress of International Association of Wood Products Societies, IAWPS 2005: 2 presentation

The 17th Annual Meeting of the Japanese Society of Environmental Entomology and Zoology: 2 presentations

The 3rd Conference of Pacific Rim Termite Research Group: 1 presentations

The 42nd Annual Meeting on Radioisotope and Radiation Research: 1 presentation

The 21st Annual Meeting of Japan Wood Preservation Association: 1 presentation

The 5th International Congress on Urban Pests: 1 presentation

The 3rd Conference of Pacific Rim Termite Research Group: 2 presentations

The 36th Annual Conference of the International Research Group on Wood Preservation: 3 presentations

The 49th Meeting of the Materials Science Group in Japan Materials Council: 1 presentation

The 3nd Annual Meeting of The Wood Carbonization Research Society: 1 presentation

Carbon 2005: 1 presentation

The 32st Annual Meeting of Carbon Materials: 2 presentations

The 52nd Spring Meeting of The Japan Society of Applied Physics and Related Societies: 1 presentation

The 72nd Autumn Meeting of the Electrochemical Society of Japan : 1 presentation

The 1st International Conference on Carbon for Energy Storage and Environment Protection: 1 presentation

A-3. Off-campus activities

Membership in academic societies (roles)

Imamura, Y.: Japan Wood Research Society (President), Japanese Association of Wood Technology (Trustee and member of project committee in Kansai branch), Japan Wood Preserving Association (Trustee and vice president), Japanese Society of Environmental Entomology and Zoology (Trustee and vice president), Wood Carbonization Research Society (Vice president)

Tsunoda, K.: Japan Wood Preserving Association (Chairman of the committee for the promotion of Nishinihon project)

Yoshimura, T.: Japanese Society of Environmental Entomology and Zoology (Trustee), Material Research Society, Japan (Editorial board and secretary of research party on wood-based materials), Japan Termite Control Association (Council, Editor-in chief, Vice president of Kansai), Japan Wood Preserving Association (Editorial board)

Hata, T.: Technical and Editorial Committee of Wood Carbonization Research Society (Member of the Steering Committee), Japan Wood Preserving Association (Member of the Committee for the Promotion of Nishinihon Project)

Research grants

Imamura, Y: Grant-in-aid for Scientific Research (C), The development of wood-nano-capsule containing metals by fast heating system (Head investigator), Grant-in-aid for Scientific

Research (B) (2) Development of thermal conversion technology of wood biomass to carbon nano-tubes (Fellows), Grant-in-Aid for Scientific Research (B) Non-destructive survey of wooden cultural products with AE and radar technologies and inspection of treatments (Fellows)

Tsunoda, K.: Grant-in-Aid for Scientific Research (B) Recoverable soil treatment units against termites based on grooming behavior

Yoshimura, T: Grant-in-Aid for Scientific Research (A) Bio-processing of preservative treated wood and wood-based materials with deteriorating organisms and the production of new energy resources (Head investigator), Grant-in-Aid for Scientific Research (B) Non-destructive survey of wooden cultural products with AE and radar technologies and inspection of treatments (Fellows), Grant-in-Aid for Scientific Research (B) Verification of anti-fungal and anti-termite effectiveness of non-chemical humidity regulating materials in houses (Fellows)

Hata, T.: Grant-in-Aid for Scientific Research: (C) Formation mechanism of nano-pore structure in wood charcoal (Fellows), Grant-in-Aid for Scientific Research: (B) Development of thermal conversion technology from wood biomass to carbon nanotubes (Head investigator), Grant-in-Aid for Scientific Research: (Exploratory) Development of carbonized-wood substrate for diffusing heat in solar power satellite (Head investigator), Grant-in-Aid for JSPS Fellows: Novel extraction technology to purify environment contaminated by preservative treated wood (Head investigator), Sumitomo Foundation for Environmental Study: Purification by meso-porous materials of humano-environment contaminated by toxic elements (Head investigator), Grant-in-Aid for Scientific Research: (C) Utilization and Application of meso-porous carbons with crystal characteristic for electrodes (Fellows)

A-4. International cooperation and overseas activities

International cooperations

Imamura, Y.: Coordinator of JSPS-LIPI Core University Program in the Field of Wood Science

Hata, T.: Special Lecture in Casetsart Univ.

International meetings (roles)

Imamura, Y.: The 6th International Wood Science Symposium; Bali, Indonesia (Japanese organizer), International Congress of International Association of Wood Products Societies, IAWPS 2005; Yokohama (Program Chairman)

Tsunoda, K.: 5th ICUP 2005: Singapore (Keynote speaker), The 3rd Conference of Pacific-Rim Termite Research Group; Guangzhou, China (President)

Yoshimura, T.: The 6th International Wood Science Symposium; Bali, Indonesia (Chair person), International Congress of International Association of Wood Products Societies, IAWPS 2005; Yokohama (Chair person), The 3rd Conference of Pacific-Rim Termite Research Group; Guangzhou, China (Secretary General)

Membership in international academic societies

Imamura, Y.: The International Research Group on Wood Preservation (Executive council)

Tsunoda, K.: IUFRO Working Party 5.03.05 (Coordinator), Pacific-Rim Termite Research Group (President)

Tsunoda, K.: Pacific Rim Termite Research Group (President)

Yoshimura, T.: Pacific Rim Termite Research Group (Secretary general)

International joint research, overseas research surveys

Imamura, Y.: Joint research on deterioration of wood by outdoor exposure (Indonesia, Malaysia), Properties enhancement of wood by chemical modification (Brazil), Joint research on wood preservation and recycling system of waste treated wood (Turkey)

Tsunoda, K.: Durability of sill plates under service conditions (USA, Canada), Filed evaluation of preservative-treated wood (New Zealand)

Yoshimura, T.: Joint research on anti-termite performances of synthetic plastic materials (Australia), Joint research on the colony structure of Coptotermes formosanus (Australia), Joint research on the novel natural wood preservatives (Finland), Joint research on heat-treated wood (Finland), Research survey on termite problems in Papua, Indonesia (Indonesia)

Hata, T.: Microstructural investigation of wood based carbon materials (The Netherlands), Development of SiC nanorods and MWNT from wood waste and its new utilization (France), Fundamental study of carbonized biomass and wood (Indonesia)

Scholars from abroad

Collaborative researchers: 4 (Istanbul University・Turkey, University Sarawak Malaysia・Malaysia, The University of Sydney・Australia, University of California・USA)

B. Educational Activities (2005.4-2006.3)

B-1. On-campus teaching

a) Courses given

Undergraduate level: Wood Preservation (Imamura and Yoshimura), Science for Humanosphere-Wood Biomass (Hata)

Graduate level: Lecture on Wood Deterioration Control II (Tsaunoda), Seminar on Wood Deterioration Control (Imamura, Tsunoda, Yoshimura and Hata), Laboratory Course of Wood Deterioration Control (Imamura, Tsunoda, Yoshimura and Hata)

B-2. Off-campus teaching, etc.

Part-time lecturer

Imamura, Y.: Special lectures in Graduate School of Agriculture, Kyushu University, Special lectures in Graduate School of Agriculture, Nagoya University

Yoshimura, T.: Special lectures in Graduate School of Agriculture, Nara Women's University

Hata, T.: Annual Meeting for TLO Information Technology Club No8-1

Open seminar, etc

Imamura, Y.: Open seminar of Takasaki Health and Welfare University on Wood Utilization for Environment Friendly and Sustainable Society, Congress on Core University Program of JSPS (Sustainable Production of Tropical Forest Resources), Seminar of Senior Natural University on Human, Wood and Earth, Special Seminar of Tokushima City on How to Provide Functions to Wood

Yoshimura, T.: Wood Science Seminar of Wood Technological Society of Japan (Lecture), The Special Seminar of Super Science High School (SSH) Program (Lecture), RISH Open Seminar (Lecture), Kyoto University Junior Campus Program (Lecture), The Society for the Research of House and Household Insect Pests, Japan (Invited lecture), The 2nd

Symposium on the Sustainable Energy Recycling – Biomass conversion and SPS – (Lecture), RISH Cooperative Seminar (Lecture), The 29th Rish Symposium – DOL/LSF Cooperative Research Projects- (Lecture)

B-3. Overseas teaching

Students and research fellows from abroad

Foreign students: Doctor's Program: 2 (Korea, Indonesia), Post-doctorate Fellow: 2 (Turkey, India), Research Student: 1 (Indonesia)

Lectures

Imamura, Y.: Special Lecture on Wood Preservation in Indonesia Spring School at Cibinon

Yoshimura, T.: Special Lecture on Termite Problems and Their Control in Japan at Papua State University, Indonesia

C. Other remarks

Imamura, Y.: Kyoto University (Council member of Kyoto University Rakuyukai) , ISO/TC Wood Preservation Committee (Chair person), Japanese Agency for the Evaluation of Wood Preservatives (Chairman of technical committee), , Japan Housing and Wood Technology Center (Council member), Nara Prefecture (Member of Forestry Research Council), Kumiyama Town (Member of Town Planning Council)

Yoshimura, T.: Agriculture, Forestry and Fisheries Technical Information Society (Member of professional technical committee), Japanese Agency for the Evaluation of Wood Preservatives (Member of technical committee)

Hata, T.: Society for the Study of Biomass Energy (Member of Professional Technical Committee)

2.2.20 Laboratory of Structural Function

Staff *Professor* *: Komatsu, Kohei, Dr. Agric. Sci.*
Assistant Professor : Takino, Shinjiro, Dr. Agric.Sci.
Assistant Professor : Mori, Takuro, Dr. Engr..

Students and research fellows
Overseas special research fellows : (2)
Doctor's program : (4)
Master's program : (1)

A. Research Activities (2005.4-2006.3)

A-1. Main subjects

In order to develop reliable wooden structures, it is important to select the optimum joint methods having high joint efficiency for both stiffness and strength. We are developing various engineered timber joints or/and structural units and analyzing their behaviors through full-scale experiments as well as theoretical modeling on the basis of timber engineering, wood science and technologies, and structural engineering.

1. Development of Engineered Timber Joint for Medium or/and Large Scale Timber Construction.

a) Research and development of large finger jointed glulam frame corners.

There is a jointing method called as “Large Finger Joint (LFJ)” to make glulam beams and columns glued joint on-site directly. As this joint method is completed by gluing literally large fingers joint on-site, it requires less steel connectors, is low-cost and has high initial stiffness. But the failure mode is quite brittle. Especially in the case where two members are jointed having finite angle, the joint part tends to fail most brittlely in the mode of tension perpendicular to the grain subjected to open mode moment. In this research subject, we are investigating strength expression mechanism and developing improvement methods for preventing brittle failures.

b) Evaluation of pull-out capacity of Lagscrewbolt and its application to glulam frame structures.

We developed screw-in type connector called as ‘Lagscrewbolt (LSB)’ as an innovating fastener using minimum steel and high aesthetic concealed joint, and are investigating its strength expression mechanism. At the same time, we are developing structural design method as well as recognizing safety of LSB by full-scale experiments in order to applying LSB to the actual glulam portal frame structures, thus we expect LSB would be used more widely in general wooden constructions.

c) Development of High Ductility and High Strength Wooden Portal Frames Using Mixed Species Glulam.

Mixed species glulam is constituted by domestic Sugi inner laminae whose mechanical properties are relatively inferior to others and imported Douglas fir outer laminae whose mechanical properties are relatively superior. We are developing glulam portal frames which are composed of mixed species glulam for all members and their beam-column joints and leg joints are assembled by using steel gusset plates with flange parts though where embedment stresses can be transmitted to the glulam members so as to utilize stronger properties of outer laminae.

2. Development of Wooden Eco Hose Utilizing Natural Building Materials.

In order to establish one of the basic facilities for the mission researches as well as the domestic cooperative researches in Research Institute for Sustainable Humanosphere, we are developing a prototype wooden post & beam house composed of only such natural materials as wood, mud and bamboo etc. In 2005, a two story experimental house of 5.4m x 9.1m plane was built to make sure innovating points in practical works and to estimate structural performance by experienced in actual election process.

3. Estimation and Analyses of Mechanical Properties of Various Wooden Structural Components

a) Estimation of various wooden shear walls.

We are estimating strength ratio (multiplier) of various shear walls composed of such materials as plywood, oriented strand boards or mud shear wall, and braces made of sawn timbers cooperating with commercial based companies. In addition to this, we also investigate the effects of loading methods (leg fixed style, tie-lot style and dead weight style)

b) Investigation on the mechanism of stiffness and strength in ductile moment-resisting joints focused on the role of traditional Nuki or Kusabi joints.

Nuki or Kusabi is important structural component in traditional wooden structures. Its initial stiffness, however, is relatively low so that its application to modern wooden constructions

seems to be difficult if traditional style is rigorously applied. In this research subject, we intend to develop a new ductile, stiff and strong moment-resisting joint based on traditional timber joint mechanism by mixing latest technology while keeping advantage points of traditional joint which is essentially ductile.

c) Structural utilization of Sugi compressed dowels.

High density joint supplemental material can be easily produced by compressing relatively low density Sugi timber up to 30 to 50 % of the original volume. In this research subject, we are developing innovating timber joint method with less stress relaxation function by making use of both characteristics of 'high strength properties' and volume recovering with water absorption. Actually, we are investigating applicability of Sugi compression timber to Kusabi (wedge) or Syachi (shear connector).

A-2. Publications and presentations

Publications

Original papers

Makoto NAKATANI and Kohei KOMATSU: Mechanism of Pull-out Performance of Lagscrewbolted Timber Joints I. Effects of lead hole diameter, embedment depth, embedment direction and edge distance on pull-out performance. Mokuzai Gakkaishi, 51(2), 125-130, 2005. (in Japanese)

Makoto NAKATANI and Kohei KOMATSU: Mechanism of Pull-out Performance in Lagscrewbolted Timber Joints II, Development of a theory of pull-out properties parallel to the grain. Mokuzai Gakkaishi, 51(5), 311-317, 2005. (in Japanese)

Yasuo KATAOKA, Koji OGAWA, Kohei KOMATSU and Atsushi TABUCHI: Fundamental research on recycled mud to be used for shear wall. Journal of Structural Engineering, AIJ, 591, 93-98, May, 2005. (in Japanese)

Anita Firmanti, Efendi Tri Bachtiar, Surjono Surjokusmo, Kohei Komatsu, Shuichi Kawai: Mechanical stress grading of tropical timbers without regard to species. Journal of Wood Science, Vol.51(4), 339-347,2005.

Atsushi TABUCHI, Akihisa KITAMORI, Takuro MORI and Kohei KOMATSU: Lateral Shear Performance of Kokabe-wall on Kyoto-townhouse Style. J. of structural engineering, Vol.51B, 497-502, March, 2005. (in Japanese)

Takuro MORI, Wataru KAMBE, Takashi TAKEDA, Takeo HASHIZUME and Akira SASAGAWA : The Bending Creep behavior of Large Dimensional Glulam Beam from Japanese Larch under the Uncontrolled Condition. J. of structural engineering, Vol.52B, 439-445, March, 2006. (in Japanese)

Reports

Komatsu, K.: Joints for Timber and Wood Based Materials, Kyoryo to Kiso (Bridge and Foundation), 39(8), 131-132, 2005. (in Japanese)

Komatsu, K., Mori, T., Kitamori, A., Nakatani, M., Hosokawa, K., Hattori, S., Matsuoka, H. and Yanaga, K.: Development of Ductile and High-Strength Semi-Rigid Portal Frame Composed of Mixed-Species Glulams and H-shaped Steel Gusset Joints, Proceedings of the 9th Meeting of Japan Timber Engineering Society, 4pp, Tokyo, December, 2005. (in Japanese)

Komatsu, K., Hosokawa, K., Hattori, S., Matsuoka, H. and Yanaga, K.: Development of Portal

Frame Composed of Mixed-Species Glulams and H-shaped Steel Gusset Joints, Kenchiku Gijutsu (Architectural Technique) , 11, 172-173, 2005. (in Japanese)

Kohei Komatsu, Aki Nitta, Yasunobu Noda, and Takuro Mori : Radial Stress in Glulam Frame Corner with Large Finger Joint (LFJ), Proceedings of 6thIWSS, Bali, August, 2005.

Maryoko Hadi, Bambang Subiyanto, Anita Firmanti, Kohei Komatsu, and Sutadji Yuwasdiki, Beam-Column Joint of Acacia mangium-Albizia falcataria Glulam with Bolt Fasteners, Proceedings of 6thIWSS, Bali, August, 2005.

Sutadji Yuwasdiki, Kohei Komatsu, Bambang Subiyanto, Anita Firmanti and Maryoko Hadi : Studies on LVL Processed Wood for Structure of Construction Building, Proceedings of 6thIWSS (Intordactory), Bali, August, 2005.

Kohei Komatsu and Yasuo Iijima : Development of Sugi and Douglas-fir Mixed Species Glulam and the Performance of Portal Frames composed of Mixed Species Glulam, International Workshop on Timber Structures "The Utilization of Low Density Timber as Structural Materials" , Bandung, Indonesia, 15-16th November, 2005.

Kohei Komatsu, Yakni Idris, Ee-Ding Wong, Shinjirou Takino, Takuro Mori, Sutadji Yuwasdiki, Anita Firmanti, Bamgbang Subiyanto, Maryoko Hadi and Kuniharu Yokoo : Utilization of Falcatalia and Rubber Wood Mixed Species Laminated Veneer Lumber (LVL) or Laminated Veneer Board (LVB) to Structural Components of Wooden Houses, International Workshop on Timber Structures "The Utilization of Low Density Timber as Structural Materials" Bandung, Indonesia, 15-16th November, 2005.

Norimoto, M., A. Matsumoto, M. Sasada, M. Inoue, T. Mori and S. Kawai : The Preparation of a High Strength Material from Bamboo Fiber Bundles, Proceedings of 6thIWSS (Intordactory), Bali, August, 2005.

Takino, S., K.Komatsu, Y.Idris, B.Subiyanto and S.Yuwasdiki : Shear Resistance of Thick Floor Panels Nailed to Wood Frame Floor Systems, Proceedings of 6thIWSS (Intordactory), Bali, August, 2005.

Maryoko Hadi, Bambang Subiyanto, Anita Firmanti, Kohei Komatsu : Beam-Column Joint of *Acasia Mangium-Albizia Falcataria* Glulam with Bamboo Dowel Fasteners, Proceedings of IAWPS2005, Yokohama, 27-30th November, 2005.

Kohei Komatsu, Jung Kiho, Shinjirou Takino : Reinforcement of Glulam Beam with a Plumbing Hole by Nailed-on-Plywoods Gusset Method, Proceedings of IAWPS2005, Yokohama, 27-30th November, 2005.

Yakni Idris, Kohei Komatsu : Lateral Shear Test of Singly and Doubly Braced Wood Shear Walls Proceedings of IAWPS2005, Yokohama, 27-30th November, 2005.

Hideki Morita, Yoshiyasu Fujimoto, and Kohei Komatsu : Shear Strength of Sugi Laminae with Low Young's Modulus Grown in Miyazaki Prefecture, Proceedings of IAWPS2005, Yokohama, 27-30th November, 2005.

Mori, T., A. Kitamori and K. Komatsu : Effect of Testing Methods on the Mechanical Behaviors of Wooden Plate Shear Walls, Proceedings of 6thIWSS (Intordactory), Bali, August, 2005.

Mori, T., M. Nakatani and K. Komatsu : An Experimental Study on the Strength Properties of the Moment Resisting Beam-column Joint using Lagscrewbolt, Proceedings of IAWPS2005, Yokohama, 27-30th November, 2005.

Inoue, M., K. Tanaka, T. Mori, K. Takehira, M. Inoue, M. Inayama and N. Ando : Possibilities of Wood Based Connector for Timber Structure, Proceedings of IAWPS2005, Yokohama,

27-30th November, 2005.

b) Conference and seminar papers presented

The 2005 Annual Meeting of the Japan Wood Research Society (16-18, March, 2005): 13 papers

The 2005 Annual Meeting of Arch. Inst. of Jap. (1-3, September, 2005): 8 papers

A-3. Off-campus activities

Membership in academic societies (roles)

Kohei Komatsu: The Japan Wood Research Society (Editor-in-Chief and board member, respectively), The Society of Materials Science (Reviewer), Architectural Institute of Japan (Committee Member of Timber Structure, Chief of Sub-Committee for Design of Timber Joints, and Sub-Committee Member for Revision of Timber Design Standards, respectively)

Shinjiro Takino.: The Japan Wood Research Society, Architectural Institute of Japan

Takuro Mori: The Japan Wood Research Society, Architectural Institute of Japan, Wood Technological Association of Japan

Research grants

Kohei Komatsu: Monbukagaku-sho Research Grant (B2), Development of wooden skeleton -infill structures by taking ideas from traditional timber structures. (Chief Investigator)

Kohei Komatsu: Innovative research development of timber joint utilizing compressed timber. (Chief Investigator)

Kohei Komatsu: 2005 MAFF Research Grant on Utilization of Latest Technologies, (Chief Investigator) , Development of Wooden Post and Beam Frame Structure by Utilizing Natural and Environmentally Friendly Structural Materials.

Takuro Mori: Japan Society for the Promotion of Science (A), Development of wooden post and beam structure using light connectors. (Chief Investigator)

Takuro Mori: The Maeda Engineering Foundation Research Grant, Development of joints for a large structural building using wooden materials (Head Investigator).

A-4. International cooperation and overseas activities

International meetings (roles)

Kohei Komatsu: 6th International Wood Science Seminar, 29-31, August, 2005, Bali, Indonesia (Presenter, Session chairman)

Kohei Komatsu: Workshop on the utilization of Row Density Timbers, 14-17, November, 2005. Bandon, Indonesia (Presenter)

Kohei Komatsu: International Symposium on Wood Science and Technologies 2005, 27-30, November, Yokohama, 2005. (Presenter, Session chairman)

Takuro Mori: 6th International Wood Science Seminar, 29-31, August, 2005, Bali, Indonesia (Presenter, Session chairman)

Takuro Mori: International Symposium on Wood Science and Technologies 2005, 27-30, November, Yokohama, 2005. (Presenter)

Takuro Mori: Wood Science School (Spring School) 2006, 5-7, March, 2006, Cibinong, Indonesia (Lecture)

B. Educational Activities (2005.4-2006.3)

B-1. On-campus teaching

a) Courses given

Undergraduate level: Wooden Structure (Komatsu)

Graduate Level: Wooden Structural Function II (Komatsu)

Seminar in Structural Functions (Komatsu, Takino, Mori).

Laboratory Course of Structural Functions (Komatsu, Takino, Mori).

B-2. Off-campus teaching, etc.

Open Lectures

Komatsu, K.: Wooden Pure Rigid Frame Research Meeting (Lecturer), Timber engineering calculation lecture course (Kagoshima), Glulam Master (Lecture)

B-3. Overseas teaching

Overseas Lectures and Open Lectures

Takuro Mori: Wood Science School (Spring School) 2006, 5-7, March, 2006, Cibinong, Indonesia

Foreign invited researcher

RISH Invited Professor (Netherlands)

Foreign cooperative researcher 4 (1 Taiwan, 2 Indonesia, 1 UK)

C. Other remarks

Kohei Komatsu: Technical committee member of General Building Research Cooperation of Japan, Estimator for FFPRI project, Committee member of Japan Housing and Wood Technology Center for ISO-TC-165, Research Fellow in Nara Prefectural Forestry Research Center, Committee for Research on Light Timber Frame Structures.

Takuro Mori: WG member of Kansai-branch, Architectural Institute of Japan