

2.2.18 Laboratory : Innovative Humano-habitability

Member:	Professor	Imamura, Yuji, Dr. Agric. Sci.
	Associate Professor	Tsunoda, Kunio, Dr. Agric. Sci.
	Associate Professor	Yoshimura, Tsuyoshi, Dr. Agric. Sci.
	Senior Lecturer	Hata, Toshimitsu, Dr. Agric. Sci.
	Doctor's program	2
	Master's Program	4
	Post-Doctoral fellow	3
	Program-Specific Researcher	1
	Researcher	2

A. Research Activities (2009.4-2010.3)

A-1. Main Subjects

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

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

b) Integrated termite management 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 populations and foraging territories of subterranean termites and application of environmentally sound means such as 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; Detoxifying 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 degradation/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, inorganic chemicals and other possible substances

f) Conservation of wooden cultural properties

Conservation technology for wooden cultural properties and waterlogged wood.

g) Bioremediation by microorganisms related to wood degradation/deterioration

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) Faunal and floral assessments of wood-deteriorating agents in the tropical plantation forests

Biodiversity assessment of wood-deteriorating organisms, such as termites and decay fungi, in tropical plantation forests to maintain sustainability of ecosystem

i) Wood deterioration and development of electrical conductive wood in the space environment

Wood deterioration in the space environment consisting of radiations, heat cycles etc and electrical conductive wood used as a body of monitoring environment in the space.

j) 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 SiO₂ or Al₂O₃ by thermal conversion such as pulse current sintering method or flush pyrolysis.

k) Micro-structural analysis of wood carbons and their application to electro-chemical devices

Application of wood carbons to electro-chemical devices, such as lithium-batteries and fuel cells, by detailed micro-structural analyses

A-2.Publications and presentations

a) Publications

Original Papers

- Kubota, S., H. Okamoto, N. Goto, N. Mito and K. Tsunoda: Uptake of bait toxicant, bistrifluron, by foraging workers of *Coptotermes formosanus* (Blattodea:

Rhinotermitidae). Sociobiology 53; 707-717, 2009

- Nakai, K., T. Mitani, T. Yoshimura, N. Shinohara, K. Tsunoda and Y. Imamura: Effects of microwave irradiation on the drywood termite *Incisitermes minor* (Hagen). Jpn. J. Environ. Entomol. Zool. 20; 179-184, 2009
- Subekti, N. and T. Yoshimura: α -amylase activities of saliva from three subterranean termites: *Macrotermes gilvus* Hagen, *Coptotermes formosanus* Shiraki and *Reticulitermes speratus* (Kolbe). Jpn. J. Environ. Entomol. Zool. 20(4); 191-194, 2009
- Furukawa, N., T. Yoshimura and Y. Imamura: Survey of Lyctidae damages on house in Japan - Identification of species and infested area -. Mokuzai Hozon 35(6); 260-264, 2009 (in Japanese)
- Sakai, H., Y. Iwamoto, T. Itoh, K. Masuda, Y. Imamura, Y. Ohyabu, T. Kido and Y. Yoshida: Anti-decay and anti-termite effects of newly modified creosoteoil conforming to Japanese regulation for household products. Mokuzai Hozon, 35, 160-170, 2009 (in Japanese)
- Suzuki, Y., W. Ohmura and T. Yoshimura: Elastic properties of the mandible in termites - Measurements of the force closing and the strength of mandible -. J. Soc. Mater. Sci. Jap. 58(5); 424-429, 2009 (in Japanese)
- Kikuchi, H., T. Hata and Y. Imamura: Development of a novel fast pyrolysis reactor with direct pulsed current-heating for wood biomass. Mokuzai Gakkaishi 55(6), 339-345, 2009 (in Japanese)
- Sulistyo, J., T. Hata, M. Fujisawa, K. Hashimoto, Y. Imamura and T. Kawasaki: Anisotropic thermal conductivity of three-layer laminated carbon-graphitic composites from carbonized wood. J. Mater Sci 45; 1107-1116, 2009
- Sulistyo, J., T. Hata, H. Kitagawa, P. Bronsveld, M. Fujisawa, K. Hashimoto and Y. Imamura: Electrical and thermal conductivities of porous SiC/SiO₂/C composites with different morphology from carbonized wood. J Mater Sci 45; 1107-1116, 2010
- Yanagawa, A., F. Yokohari and S. Shimizu: The role of antennae in removing entomopathogenic fungi from cuticle of the termite, *Coptotermes formosanus*. Journal of Insect Science 9; article6, 2009
- Yanagawa, Y., S. Shimizu, K. Noma, M. Nishikawa, K. Ogino and F. Yokohari: Classification and distribution of antennal sensilla of the termite, *Coptotermes formosanus* Shiraki. Sociobiology 54(2); 327-349, 2009
- Kim, G. -H., W. -J. Hwang, T. Yoshimura and Y. Imamura: Laboratory evaluation of the termiticidal efficacy of copper HDO. J. Wood Sci. 56; 166-168, 2010

- Toyoumi, A., S. Horisawa, T. Yoshimura, S. Doi and Y. Imamura: The effect of different foundation systems on the fungal flora in the crawl space of a new wooden Japanese house. *Building and Environment* 45; 1054-1060, 2010

Reviews

- Yoshimura, T. and Y. Indrayani: Infestation of *Incisitermes minor* (Hagen) in Japan and its control strategies. *Life and Environment*, 54(3); 35-41, 2009 (in Japanese)
- Yoshimura, T. and Y. Indrayani: IPM for *Incisitermes minor*. *J. Environ. Cont. Tech.* 27(2); 10-20, 2009 (in Japanese)
- Yoshimura, T., S. Kawaguchi and H. Aoyagi: Termite and energy. *Jpn. J. Environ. Entomol. Zool.* 20(4); 153-164, 2009 (in Japanese)

Reports

- Imamura, Y.: Strategy for Extension of Service-Life of Wood, - Prevention of global warming and long-life of wooden houses, *Humanosphere Science* 11-18, 2009 (in Japanese)
- Imamura, Y.: Radio Boy and Insect Boy, *Agreeable No.10*, 2009 (in Japanese)
- Imamura, Y.: Chemical Modification (Green keywords), *Shinrin-gijutsu No.807*; 7, 2009 (in Japanese)
- Yoshimura, T.: Against the invasive termite infestation. *Seien No.722*; 18-21, 2009 (in Japanese)
- Yoshimura, T. and M. Murao: Results of the questionnaire survey on termite penetration points in houses. *Shiroari No.152*; 1-9, 2009 (in Japanese)
- Aya Yanagawa, Report of IBRO-ANS Advanced Neuroscience School 2009, *Comparative physiology and Biochemistry* 26(2); 75-77, 2009
- Yanagawa, A.: Study on social insect-specific resistance against entomopathogen. *Shiroari No.152*; 34-36, 2009 (in Japanese)
- Nakai, K.: Microwave technology on a non-destructive termite control method. *Shiroari No.152*; 31-33, 2009 (in Japanese)

Patents

- Hata, Toshimitsu: Japanese Patent 2009-137919, 2009.6.9

b) Conference and seminar papers presented

- The 25th Annual Meeting of Japan Wood Preservation Association: 3 presentation
- The 60th Annual Meeting of the Japan Wood Research Society: 6 presentations
- The 21st Conference of the Japanese Society of Environmental Entomology and Zoology: 4 presentations
- The 36th Annual Meeting of Carbon Materials: 1 presentation
- The 7th Annual Meeting of the Wood Carbonization Research Society: 2 presentation
- The 53rd Research Conference of the Division of Material Sciences of the Science Council of Japan: 1 presentation
- The 57th Annual Meeting of Ecological Society of Japan: 1 presentation
- The 54th Annual Meeting of the Japanese Society of Applied Entomology and Zoology: 1 presentation
- The 7th Conference of Pacific Rim Termite Research Group: 4 presentations
- Finnish Japanese Workshop on Functional Materials: 1 presentation
- CARBON 2009: 1 presentation
- The Carbon for Energy Storage and Environment Protection 2009 Conference (CESEP'09): 1 presentation
- Memorial Symposium for the 25th International Prize for Biology: 1 presentation
- Australian Neuroscience Society 30th Annual Meeting: 1 presentation

A-3.Off-campus activities

Membership in academic societies

- Imamura, Yujii, D.Agric.Sci : Japan Wood Research Society (Trustee), Japanese Association of Wood Technology (Trustee, Chair of Kansai branch), Japan Wood Preserving Association (President), Japanese Society of Environmental Entomology and Zoology (President), Wood Carbonization Research Society (Vice president)
- Tsunoda, Kunio, D.Agric.Sci : Japan Wood Preserving Association (Chairman of the Committee for the International Collaborative Affairs)
- Yoshimura, Tsuyoshi, D. Agric. Sci. : Japanese Society of Environmental Entomology and Zoology (Trustee), Japan Termite Control Association (Council, Editor-in chief, President of Kansai Branch) , Material Research Society, Japan (Reviewing board), Japan Wood Research Society (Award selection board), Japan Wood Preserving Association (Editorial board)
- Hata, Toshimitsu, D. Agric. Sci. : Wood Carbonization Research Society (Member of the steering committee and technical and editorial committee)

Research grants

1. Grants-in-aid for Scientific Research(KAKENHI)

- Scientific Research B : Imamura, Yuji : Wood deterioration under the extreme environment
- Grant-in-Aid for JSPS Fellows : Tsunoda, Kunio : Manufacturing processes to protect wood-based and wood-polymer composites from biological attacks
- Scientific Research B : Yoshimura, Tsuyoshi : Evaluation of biodiversity of wood-deteriorating organisms in tropical plantation forests and a proposal of sustainable management
- Scientific Research B : Fujii, Yoshihisa : Non-destructive survey of wooden cultural products with AE and radar technologies and inspection of treatments
- Scientific Research C : Doi, Shuichi : Interaction between termites and white rot fungi and its applicability to termite control
- Scientific Research B : Hata, Toshimitsu : Development of new type of lithium battery from carbonized wood with multiwall carbon nanotubes
- Challenging Exploratory Research : Hata, Toshimitsu : Development of carbonized-wood substrate for diffusing heat in solar power satellite
- Challenging Exploratory Research : Kojima, Hirotsugu : Development of wood-based space materials
- Grant-in-Aid for JSPS Fellows : Yanagawa, Aya : Study of disease resistant system of social insects

2. Other Research Grants

- (NEDO) Strategic Development of PEFC Technologies for Practical Application
Development of Technology for Next-generation Fuel Cells : Hata, Toshimitsu : Study on carbon alloy cathode catalysts from N-doped carbonized sugi wood prepared by pulse current sintering

A-4. International cooperation and overseas activities

Membership in academic societies

- Imamura, Yuji: International Association of Wood Products Societies (President), International Association of Wood Anatomists, The International Research Group on Wood Protection
- Tsunoda, Kunio: Pacific Rim Termite Research Group (President), IUFRO Working Party 5.03.05 (Moderator), The International Research Group on Wood Protection, International Biodeterioration & Biodegradation Society, Forest Products Society, Entomological Society of America
- Yoshimura, Tsuyoshi: Pacific Rim Termite Research Group (Secretary general), International

Union for the Study of Social Insects

- Hata, Toshimitsu: IUFRO(member), MRS-J(member)

International meetings(country,roles)

- Imamura, Yuji: Chunchon University International Symposium on the Recent Advances in Wood Biomass Research for Low Carbon and Green Growth (Korea, Keynote speaker), , The First International Meeting of Indonesia Wood Research Society (Indonesia, Keynote speaker), Forum of Korean Wooden Architecture Research (Korea, Invited speaker)
- Tsunoda, Kunio: The 7th Conference of Pacific-Rim Termite Research Group (Singapore, President)
- Yoshimura, Tsuyoshi: The 7th Conference of Pacific-Rim Termite Research Group (Singapore, Secretary general)

International joint research, overseas research surveys

- Joint research on deterioration of wood by outdoor exposure, Imamura, Yuji, Indonesia
- Joint research on wood preservation and recycling system of waste treated wood, Imamura, Yuji, Turkey
- Joint researches on durability of sill plates under service conditions, Tsunoda, Kunio, USA, Canada
- Joint research on sex ratio of subterranean termites, Tsunoda, Kuynio, USA
- Comparative study of testing methods in wood preservation, Tsunoda, Kunio, Indonesia
- Joint research on the colony structure of *Coptotermes formosanus*, Yoshimura, Tsuyoshi, Australia
- Joint research on the novel natural wood preservatives, Yoshimura, Tsuyoshi, Finland
- Joint research on termite resistance of tropical timbers, Yoshimura, Tsuyoshi, Malaysia
- Joint research on biodiversity of wood-deteriorating organisms in tropical plantation forests, Yoshimura, Tsuyoshi, Indonesia, Malaysia, Vietnam
- Microstructural investigation of wood based carbon materials, Hata, Toshimitsu, The Netherlands
- Development of application in electrochemistry from carbonized wood, Hata Toshimitsu, France
- Research of multipurpose utilization of wood materials in Indonesia, Hata, Toshimitsu, Indonesia

Visiting Research Scholars

- Guesst Research Associate 1 (USA)
- Guesst Research Associate 1 (Indonesia)

- Guest Research Associate 1 (Turkey)

B.Educational Activities(2009.4-2010.3)

B-1.On-campus teaching

a) Courses given

- Undergraduate level: Wood Preservation (Imamura and Yoshimura), Science for Humanosphere-[Development of science and technology through biomass and solar power satellite research toward a solar energy society] (Imamura, Yoshimura and Hata), Science for Humanosphere-[Development of technology and materials for cyclic utilization of bio-based resources] (Hata)
- Graduate level: Innovative Humano-habitability II (Tsunoda), Seminar on Innovative Humano-habitability (Imamura, Tsunoda, Yoshimura and Hata), Laboratory Course of Innovative Humano-habitability (Imamura, Tsunoda, Yoshimura and Hata), Lecture in Kyoto University Sustainable Initiative (Imamura)

B-2.Off-campus teaching etc.

Part-time lecturer

- Imamura, Yuji: Nagoya University, Faculty of Agriculture, Wood preservation and environment, Kyushu University, Faculty of Agriculture, Wood preservation chemistry, Nara Educational University, Faculty of Education, Wood preservation
- Yoshimura, Tsuyoshi: Tokyo University of Agriculture and Technology, Faculty of Agriculture, Degradation technology of waste materials

Open lectures, etc.

- Imamura, Yuji: Special Seminar of Japan Wood Technology Association, Kyushu-branch, Japan Wood Technology Association, Kyushu-branch, Lecturer
- Imamura, Yuji: Special Seminar of Architectural Research Association, Architectural Research Association, Lecturer
- Imamura, Yuji: Special Seminar of Agriculture Support Center of Fukui Prefecture, Agriculture Support Center of Fukui Prefecture, Lecturer
- Yoshimura, Tsuyoshi: Super Science Highschool Program, Kyoto Educational University Highschool, Lecture and experiments

- Yoshimura, Tsuyoshi: Uji Open Campus, Kyoto University, Open laboratory

B-3.Overseas teaching

International students

- International students : Master 1 (Indonesia) Doctral 1 (Indonesia) Research Students 1 (Indonesia)

Lectures and seminars

- Imamura, Yuji

Development of high-performance utilization of wood for outdoor uses, Chunchon University International Symposium on the Recent Advances in Wood Biomass Research for Low carbon and Green Growth(Special lecturer) : Chunchon University(Korea)

Morphological understanding of wood degradation and its Prevention, The First International Symposium of Indonesia Wood Research Society(Keynote lecturer) : Indonesia Wood Research Society(Indonesia)

Wood presrvation: now and future, Special Seminar of Korean Wood Preservation Assocoation(Keynote lecturer) : Korean Wood Preservation Assocoation(Korean)

- Yoshimura, Tsuyoshi

Termite, environment, energy, Special Seminar of Pontianak City(Social lecturer) : Human Settlement Division, Pontianak City(Indonesia)

Wood preservation in Japan, Special Lecture in Tanjungpura University(Special lecturer) : Faculty of Forestry, Tanjungpure University(Indonesia)

Termites for new energy options, Special Lecture in the University of Georgia(Special lecturer) : Biology Department, The University of Georgia(USA)

Registration of wood-treating biocidal chemicals in Japan, GSPPC Meeting(Special speaker) : Georgia State Pest Protection Council(USA)

IPM for dry-wood termites, TRG7 Post Conference Seminar(Invited lecturer) : Pacific-Rim Termite Research Group(Singapore)

- Hata, Toshimitsu

Development of advanced carbon materials from carbonized Sugi (Cryptomeria japonica) wood, Special lecturte in Åbo Akademi (Special lecturer) : Åbo Akademi (Finland)

C.Other Remarks

- Imamura, Yuji: ISO/TC Wood Preservation Committee (Member), Japan Housing and Wood Technology Center (Council member, Kumiyaama Town (Member of Town Planning Council),

Japan Housing & Wood Technology Center (Council member), Architectural Research Association (Council member)

- Yoshimura, Tsuyoshi : Japanese Agency for the Evaluation of Wood Preservatives (Member of technical committee), The Japan Termite Control Association (Members of Committee on general affairs, Committee on certification for termite control operators, Committee on authorizing drugs, Committee on developing new termite control strategies, Special committee on dry-wood termites and Special committee on 50 years anniversary of the association)

- Hata, Toshimitsu : Study committee of modeling urban environmental rehabilitation by use of pyrolysis bio-oil (Member), Research review committee of functional wood material research association (Member)