

Chair Laboratory of Active Bio-based Materials

2.2.16 Laboratory : Laboratory of Active Bio-based Materials

Member:	Professor	Yano, Hiroyuki
	Appointed Professor	Nakatsubo, Fumiaki
	Associate Professor	Morooka, Toshiro
	Associate Professor	Tanaka, Fumio
	Doctor's program	3
	Master's Program	4
	Post-Doctoral fellow	2
	Program-Specific Resea	5
	Researcher	7

A. Research Activities (2010.4-2011.3)

A-1. Main Subjects

a) Production and Structural Analysis on Cellulose Nanofibers

Extraction of cellulose nanofibers from wood, pulp, agricultural waste and their nano to micro structure has been studied.

b) Development of cellulose nanocomposites

Production processes of high strength cellulose nanocomposites for automotive parts and optically transparent cellulose nanocomposites for electronic devices have been studied.

c) Investigation of the moisture adsorption properties of wood and related materials

To understand physical properties of wood in a wet state above 100°C, its moisture adsorption properties at high temperature above 100°C have been studied.

d) Studies on house climate

Regulation mechanism of temperature and humidity in wooden house is investigated.

e) 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

- Nakatsubo, F.: Isolation and purification of cellulose, "Chemistry of Wood", Bun-eido Publishing, Tokyo, pp. 75-85, 2010

- Yano, H., Abe, K., Kobayashi, Y., Nogi, M.: Cellulose nanofiber-based substrate, "Current research on printed electronics technology", Suganuma, K. ed., CMC Publishing, Tokyo, 2010, 93-97

- Shimazaki, Y., Yano, H.: High heat conductive optically transparent film using cellulose nanofibers, "High heat conductive composites", Takezawa, Y. ed., CMC Publishing, Tokyo, 2011, pp. 180-186

- Yano, H.: Cellulose Nanofiber, "New edition Handbook of composites and their technology", Fukuda, H., Ben, G., Suemasu, H. ed., Sangyo Gijutsu Service Center Publishing, Tokyo, 2011, 503-508

Original Papers(including book-reviews)

- S. Ifuku, M. Nogi, M. Yoshioka, M. Morimoto, H. Yano, H. Saimoto, Fibrillation of dried chitin into 10-20 nm nanofibers by a simple method under acidic conditions, Carbohydrate Polymers, 81, 134-139, (2010)

- K. Abe, H. Yano, Comparison of the characteristics of cellulose microfibril aggregates isolated from fiber and parenchyma cells of Moso bamboo (*Phyllostachys pubescens*), Cellulose, 17 (2), 271-277 (2010)

- S. Ifuku, M. Nogi, M. Yoshioka, M. Morimoto, H. Saimoto, H. Yano: Simple preparation method of chitin nanofibers with a uniform width of 10 to 20 nm from prawn shell under the neutral conditions, Carbohydrate Polymers, 84(2), 762-764 (2011)

- L. Suryanegara, A. N. Nakagaito, H. Yano, Thermo-mechanical properties of microfibrillated cellulose-reinforced partially crystallized PLA composites, *Cellulose*, 17, 771-778 (2010)

- M. Nogi, F. Kurosaki, H. Yano, M. Takano, Preparation of nanofibrillar carbon from chitin nanofibers, *Carbohydrate Polymer*, 81(4), 9190924 (2010)

- M.I. Shams, S. Ifuku, M. Nogi, T. Oku, H. Yano (2010) Fabrication of optically transparent chitin nanocomposites, *Applied Physics A: Material and processing*, 102(2), 325-331 (2011)

- K.. Uetani, H. Yano, Nanofibrillation of Wood Pulp Using a High-Speed Blender, *Biomacromolecules*, in press.

- L.. Suryanegara, H. Okumura, A. N. Nakagaito, H. Yano, Acceleration of the injection molding cycle of PLA by cellulose nanofiber reinforcement, *Cellulose*, 18(3), 689-698 (2011)

- K.. Abe, Formation of hydrogels from cellulose nanofibers, *Carbohydrate Polymers*, 85(4), 733-737 (2011)

- Kamitakahara, H., T.Funakoshi, S.Nakai, T.Takano, F. Nakatsubo, *Macromolecular Bioscience*, 2010, 10, 638-647.: Synthesis and structure/property relationships of regioselective 2-O-, 3-O- and 6-O-Ethyl Celluloses

- Tobimatsu Y., T.Takano, H.Kamitakahara, F. Nakatsubo, *Holzforschung*, 64 (2), 173-181 (2010): Studies on the dehydrogenative polymerization of monolignol β -glycosides: part 6. Monitoring of horsedadish peroxidase-catalyzed polymerization of monolignol by GPC-PDA

- Tobimatsu Y., T.Takano, H.Kamitakahara, F. Nakatsubo, *Holzforschung*, 64(2), 183-192 (2010):
Reactivity of syringly quinone methide intermediates in dehydrogenative polymerization Part 2 : pH
effect in horseradish peroxidase-catalyzed polymerization of syringyl alcohol

- Tobimatsu Y., T.Takano, H.Kamitakahara, F. Nakatsubo, *J. Wood Sci.*, 56 (3), 69-83 (2010) :
Reactivity of syringly quinone methide intermediates in dehydrogenative polymerization I :high-yield
production of synthetic lignins (DHPs) in horseradish peroxidase-catalyzed polymerization of
syringyl alcohol in the presence of nucleophilic reagents

- T. Kawakubo, S. Karita, Y. Araki, S. Watanabe, M. Oyadomari, R. Takada, F. Tanaka, K. Abe, T.
Watanabe, Y. Honda, T. Watanabe: Analysis of Exposed Cellulose Surfaces in Pretreated Wood
Biomass Using Carbohydrate-Binding Module (CBM).Cyan Fluorescent Protein (CFP),
Biotechnology and Bioengineering, 105 (3), 499 - 508 (2010) (including book-reviews)

Reviews

- Nakatsubo, F.: Future material design based on the roll-sharing functionalization of cellulose,
Journal of The Adhesion Society of Japan, 46(4), 158-165 (2010).

- S. J. Eichhorn, A. Dufresne, M. Aranguren, N. E. Marcovich, J. R. Capadona, S. J. Rowan, C.
Weder, W. Thielemans, M. Roman, S. Renneckar, W. Gindl, S. Veigel, J. Keckes, H. Yano, K.
Abe, M. Nogi, A. N. Nakagaito, A. Mangalam, J. Simonsen, A. S. Benight, A. Bismarck, L. A.
Berglund, T. Peijs: Review: current international research into cellulose nanofibers and
nanocomposites, *J. Mater. Sci.*, 45, 1-33 (2010)

- A. N. Nakagaito, M. Nogi, H. Yano: Displays from transparent films of natural nanofibers
MRS Bulletin, 35(3) (2010) 214-218

- Yano, H.:Production and Utilization of Nanofibers, *Engineering Materials*, 58(6), 58-61(2010)

- Yano, H.:Cellulose nanofibers reinforced plastics, Reinforced plastics、56(9), 294-298 (2010)

- Yano, H.:Production and Utilization of Cellulose Nanofibers, WEB Journal, 112, 6-10 (2010)

- Yano, H.:Cellulose Nanofibers - Plnnts resources based automotive, Kagayaki、22, 23-26(2010)

- Yano, H.:Production and Utilization of Cellulose Nanofibers, J. Jpn. Energy Society、89(12), 1134-1140(2010)

- Yano, H.:Production and Utilization of Cellulose Nanofibers、Functional paper study, No.49, 15-20(2010)

- Yano, H.:Cellulose Nanofiber, Chyubu, No.68, 21-24(2011)

Reports,others

- F. Tanaka et al.: Estimation of the elastic moduli of natural cellulose crystals, Preprint of the 25th International Carbohydrate Symposium, E-P5-037, Aug. 1-6, Makuhari, Chiba

- F. Tanaka: Molecular Simulation of Biopolymers, 2010 Proceedings of the Supercomputer Laboratory, Institute for Chemical Research, Kyoto University, 108 - 109 (2011)

b) Conference and seminar papers presented

- The 61th Annual Meetings of the JWRS (10Presentation, Yano)

- 2010 TAPPI Intl Conf on Nano for the Forest Product Industry, Espoo, Finland (5 Presentations, Yano)

- 11th European Workshop on Lignocellulosics and Pulp (1presentation, Morooka)

- The 2nd International symposium Indonesian Wood Research Society (1presentation, Morooka)

- The 24th Annual Meeting of the Japanese Society for Chitin and Chitosan (1Presentation, Yano)

- The 19th Polymer Materials Forum (1presentation, Yano)

- The 17th Annual Meeting of the Cellulose Society of Japan (4 Presentations, Yano, Nakatsubo)

- International Conference on Sustainable Future for Human Security (1Presentation, Yano)

- 241th American Chemical Society National Meeting & Exposition (1Presentation, Yano)

- ASIATEC2011 (1Presentation, Yano)

- The 18th Indonesian Scientific Meeting (1Presentation, Yano)

- The 25th International Carbohydrate Symposium (1presentation, Tanaka)

A-3.Off-campus activities 1

Membership in academic societies

- Yano, H. : Member of The Japan Wood Research Society (Councilor), Member of The Society of Materials Science (Reviewer), Member of The Wood Technological Association of Japan (Kansan branchi committee member), Member of the Cellulose Society of Japan, Member of The Chemical Society of Japan

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

- Tanaka, F. : Member of the Society of Polymer Science, Japan, Member of the Society of Fiber Science and Technology, Japan, Member of the Society of Computer Chemistry, Japan, Member of the Japanese Society of Carbohydrate Research, Member of the Crystallographic Society of Japan, Member of the Cellulose Society of Japan, Member of SPring-8 Users Society

Membership in Science Council of Japan, etc.

- Nakatsubo, F. : Member of the Cellulose Society of Japan, Member of The Society of Materials Science, Member of The Japan Wood Research Society, Member of the Synthetic Organic Chemistry, Japan

A-3. Off-campus activities 2

Research grants

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

- Grant-in-aid for Scientific Research (B) : Yano, H : Fundamental study for the extraction of uniform nanofibers from plant resources

- Grant-in-aid for JSPS postdoctoral fellowship for Foreign Researches : Yano, H : Effect of hemicelluloses content on the viscoelastic properties of nanofiber sheets

- Grant-in-aid for Scientific Research (B) : Nakatsubo, F. : Basic studies on the fabrication of cellulosic bulk hetero junction solar cell

- Grant-in-aid for JSPS postdoctoral fellowship : Uetani, K. : Nanofibrillation of Plant Resources Using a High-Speed Blender

2.Other Research Grants

- NEDO"Fundamental Technology for Green Sustainable Chemical Process" : Yano, H :Development of green and high performance automotive parts reinforced by cellulose nanofibers

A-4.International cooperation and overseas activities 1

Membership in academic societies

- Nakatsubo, F.: American Chemical Society

International meetings(country,roles)

- Yano, H. : 11th International Conference on Biocomposites, Canada, Toronto、5/2-5/4(Keynote), 2010 International Workshop on Wood biorefinery and Tree Biotechnology, Ornskoldsvik, Sweden, 6/21-23(Invited Speaker)

- Nakatsubo, F. : Workshop on "Novel Nanotechnology and Nanomaterials for "Science for Human (2010)"(Invited Speaker)

A-4.International cooperation and overseas activities 2

Visiting Research Scholars

- JSPS postdoctoral fellow 1 (Czech Republic)

B.Educational Activities(2010.4-2011.3)

B-1.On-campus teaching

a) Courses given

- Undergraduate level: Wood Composite Products (Yano), Science for Sustainable Humanosphere (Yano, Morooka, Tanaka)
- Graduate level: Bio-based Materials Physics II (Yano, Morooka, Tanaka), Seminar in Bio-based Materials Physics (Yano, Morooka, Tanaka), Laboratory course in Bio-based Materials Science (Yano, Morooka, Tanaka), Science for Creative Research and Development of Humanosphere (Tanaka, et al), Wood and Culture (Yano)

B-2.Off-campus teaching etc.

Open lectures, etc.

- Yano, H.: 150th RISH MISSION Symposium (RISH, Lecturer)
- Yano, H.: Annual meeting of functional paper study group (Ehime pulp and paper industry association, Lecturer)
- Yano, H.: Organic devices research study group seminar (Organic devices research study group, Lecturer)
- Yano, H.: Cellulose mini symposium (Cellulose society, Kanto branch, Lecturer)
- Yano, H.: Niigata natural materials study group seminar (Niigata material and manufacturing network, Lecturer)
- Yano, H.: Sustainable lignocellulosic resources technology study group 17th seminar (AIST, Lecturer)
- Yano, H.: 4th Forum on future polycarbohydrate (Lecturer)
- Yano, H.: Japan fiber society pulp and paper study group seminar (Japan Fiber Society, Lecturer)

- Yano, H.: Forum on Polymer Materials (Japan Polymer Society, Lecturer)

- Yano, H.: JSPS the 142nd committee seminar (JSPS, Lecturer)

- Yano, H.: Nano particle and related technology study group seminar in Aichi prefecture (Aichi industrial technology institute, Lecturer)

- Yano, H.: Biomass Technology Seminar in Okayama (Chyugoku region research center, Lecturer)

- Yano, H.: 170th RISH MISSION Symposium (RISH, Lecturer)

- Yano, H.: Fiber manufacturing technology study group seminar (Fiber manufacturing technology study group, Lecturer)

- Yano, H.: 7th Business seeds strategy group seminar (Kansai Information and industry center, Lecturer)

B-3.Overseas teaching 1

International students

- International students : Doctral 1 (Indonesia)