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 83 students (41 freshmen and 52 2nd year students) in the Master’s program and 60 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 2007**

   The orientation course for freshmen on April 6 at the Graduate School of Agriculture in Kitashirakawa Campus offered a curriculum-guidance. On May 12, general profiles in our division and recent research activities in the belonging 20 laboratories were introduced at Kamigamo Experimental Station. After the introduction, a short Station-tour and subsequent welcome party were carried out.
2.2.1 Laboratory of Forest Resources and Society

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

Students and research fellows
  Doctor’s program : (3)

A. Research Activities (2007.4-2008.3)

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.
b) Production and uses of forest products  
The topics include wood, paper and bamboo from the view point of historical development.

A-2. Publications and presentations  
a) Publications  
Books  
Iwai, Y.: Economic history of bamboo, changes of bamboo industry in western part of Japan, pp.1-188, shibunkaku-shuppan, Kyoto (in print, in Japanese)

Original papers  

b) Conference and papers presented  
The 2008 Kansai branch meeting of Japanese Forest Economic Society (1)
The 118th meeting of Japanese Forest Society (1)
The 119th meeting of Japanese Forest Society (1)

B. Educational Activities (2007.4-2008.3)

B-1. On-campus teaching  
a) Courses given  
Undergraduate Level: World Forest Resources (Iwai)
Graduate level: Seminar in Forest Resources and Society (Iwai), Laboratory Course in Forest Resources and Society (Iwai)

C. Other remarks  
Iwai, Y.: Committee of Public Works Evaluation in Shiga Prefecture.
2.2.2 Laboratory of Tropical Forest Resources and Environments

Staff

Professor: Ohta, Seiichi, D. Agric. Sci.
Ass. Professor: Kanzaki, Mamoru, D. Sci.
Assistant Professor: Kaneko, Takayuki

Students and research fellows

Doctor's program: (10)
Master's program: (10)
Undergraduate: (3)

A. Research Activities (2007.4-2008.3)

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. The soil management for the reduced emission of GHEG is also studied.

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

To elucidate the factors which controlling the distribution of evergreen forest and deciduous forest in tropical seasonal region, 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 are studied in Northeastern Thailand.

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 and a mangrove forest of Myanmar 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

Original papers

Toda T., Takeda H., Tokuchi N., Ohta S..., Wacharinat C. and Kaitpraneet: Effect of forest fire on the nitrogen cycle in a dry dipterocarp forest, Thailand, Tropics, 16 (1), 41-45, 2007


Tatsuhiro OHKUBO, Masato TANI, Hideyuki NOGUCHI, Takuo YAMAKURA, Akira ITOH, Mamoru KANZAKI, Hua Seng LEE, Sylvester TAN, Peter S. ASHTON adn Kazuhiko OGINO.: Spatial and topographic patterns of canopy gap formation in a mixed dipterocarp forest in Sarawak, Malaysia. Tropics, 16(2), 151-163, 2007


b) Conference and seminar papers presented

The 118th Ann. Meeting of Japanese Forest Society (14)
The 17th Ann. Meeting of Japanese Society of Tropical Ecology (3)
The 54th Ann. Meeting of Ecological Society of Japan (1)
The 119th Ann. Meeting of Japanese Forest Society (11)
3rd International Conference on Mechanisms of Organic Matter Stabilisation and Destabilisation in Soils and Sediments (1)
The Fifth Conference of the Pacific Rim Termite Research Group Bali, Indonesia (1)
Workshop on Synthetic Evaluation of the Effect of Acidic Load on Material Flows in East Asian Catchments Areas (1)
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 Pedogogist (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; Evaluation of the tropical fast growing species plantation as N2O emission source and mitigation options. (Rep. Ohta, Kaneko,)


Kiban-kenkyu A: Function in carbon, nutrients and water cycling within seasonally dry tropical forests. (Ohta, Kanzaki, Rep. A. Ishida)

Kanzaki M.: 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, Kanzaki. Rep. Y. Kiyono)


Kiban-kenkyu A: Function in carbon, nutrients and water cycling within seasonally dry tropical forests. (Ohta, Kanzaki, Rep. A. Ishida)

Kiban-kenkyu B-2: Geographic changes of multiscale distribution pattern of tree species of Fagaceae in Asian tropical montane forest. (Kanzaki, Rep. T. Ohkubo)


Kaneko T.: JSPS research grant: Kiban-kenkyu A-2; Evaluation of the tropical fast growing species plantation as N2O emission source and mitigation options. (Rep. Ohta, Kaneko,)

Fukushima M.: Grant for Research Fellow DC1; Forest utilization pattern of Karen people under different forest management policies (M. Fukushima), Grant for Research Fellow

Sugimoto M.: Grant for Research Fellow DC2; Asynchronism of Nitrogen budget and it's effects on soil elements dynamics in fast-growing tree plantations of Acacia mangium in the tropics (M. Sugimoto)

A-4. International cooperation and overseas activities

International joint researches, overseas research surveys

Ohta, S.: Study on clarifying the soil acidification under leguminous fast-growing tree plantation in humid tropic (Indonesia), Survey for the Project of technical development for promoting CDM tree plantation (Indonesia), Carbon, nutrients and water cycling within seasonally dry tropical forests (Thailand)

Kanzaki, M.: Carbon, nutrients and water cycling within seasonally dry tropical forests (Thailand), Study 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), Biomass growth and soil carbon of
mangrove plantation in Myanmar (Myanmar)
Kaneko, T.: Study on clarifying the soil acidification under leguminous fast-growing tree plantation in humid tropic (Indonesia)

*Scholars from abroad*
Invited foreign scholar 1 (Thailand)

**B. Educational Activities (2007.4-2008.3)**

**B-1. On-campus teaching**

a) Courses given
Undergraduate level: Forest Science I (Ohta, Kanzaki), 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 III (Kanzaki), Environmental Studies A (Kanzaki)
Graduate level: Tropical Forest Environment (Ohta), Seminar in Tropical Forest Resources and Environments (Ohta, Kanzaki), Practice in Tropical Forest Environments (Ohta, Kanzaki), Scientific Writing and presentation in English (Kanzaki)

**B-2. Off-campus teaching, etc.**

*Part-time Lectures*
Kanzaki, M.: JICA Training Course: Conservation and Sustainable Management of Mangrove Ecosystem (Lecturer)

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

**B-3. Overseas teaching**

*Students and research fellows from abroad*
Master Course 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
2.2.3 Laboratory of Forest Environment Planning

Staff

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

Students and research fellows

Master’s program: (1)
Undergraduate: (6)

A. Research Activities (2007.4-2008.3)

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

Reports


A-3. Off-campus activities

Membership in academic societies (roles)

Matsushita, K.: Japanese Forest Economic Society (Awords Committee), Kansai Branch of the Japanese Forest Society (Editor), Common Forest Society of Middle Japan (Editor, Executive Committee of 28th Annual Meeting)

B. Educational Activities (2007.4-2008.3)

B-1. On-campus teaching

a) Courses given

Undergraduate Level: Exercises in Information Processing Basics (Matsushita), Forest and Biomaterial Science IV (Matsushita), Laboratory Course in Forest and Biomaterials Science IV (Matsushita), Laboratory Course in Applied Forest and Biomaterial Science (Matsushita), Forest Planning (Matsushita), Forest Law (Matsushita), Reading of Foreign Lieterature II (Matsushita), Seminar in Forest and Biomaterial Science (Matsushita)

Graduate level: Forest Management (Matsushita)

b) Part-time Lectures

Matsushita, K.: Faculty of Agriculture, Kyoto Prefectural University (Forest Policy I, Forest Policy II)

C. Other remarks

Matsushita, K.: 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
2.2.4 Laboratory of Forest Utilization

**Staff**
- **Professor**: Osawa, Akira, Ph.D.
- **Associate Professor**: Okada, Naoki, Dr. Agric. Sci.
- **Instructor**: Hasegawa, Hisashi, Dr. Agric. Sci.

**Students and research fellows**
- **Doctor's program**: (5)
- **Master's program**: (5)
- **Undergraduate**: (3)

**A. Research Activities (2007.4-2008.3)**

**A-1. Main subjects**

a) **Stand development and carbon dynamics of boreal forests**

Stand development and carbon accumulation and dynamics after large-scale disturbances are studied in boreal forest ecosystems, particularly of high-latitude coniferous forests in the northern hemisphere. Chronosequence stands have been selected, their stand structures measured, and carbon dynamics patterns estimated by the ecological summation method in Gmelin larch forests of central Siberia in the continuous permafrost zone, and jack pine forests of northwestern Canada. Sum of fine-root ingrowth and mortality was estimated as 409, 454, and 203 gC/m²/year for the young, medium age, and old jack pine forests, respectively, indicating that 85%, 86%, and 74%, respectively, of NPP of these forest ecosystems goes to the fine-root compartment. Compared to published literature, these proportions are unusually large for a forest ecosystem. Generality of this estimate needs to be examined by further analyses.

b) **Growth of tropical trees**

Wood anatomical methods for detecting growth rings were applied to Dipterocarpaceae species in seasonally dry forests in Thailand, and crossconfirmed with the method of carbon isotope analysis. Vessel traits (mean lumen diameter, proportion of lumen area and vessel number per cross sectional area) showed cyclic changes along radius, indicating that the traits are under the influence of the growing environment. Mean lumen diameter and proportion of lumen area showed negative correlations with the carbon isotope ratio of xylem, whereas vessel density showed a positive one. The results indicated that the difference of soil moisture availability between the wet and dry seasons causes the variation of both carbon isotope ratio and vessel traits.

c) **Structure and function of broad-leaved trees**

Water relations and wood anatomy of five broad-leaved tree species growing in different soils were investigated to evaluate the effect of soil nutrient content on physiology and wood formation. Trees growing under a poor nutrient condition tended to form narrower vessels and to have thicker leaves than those under a better soil condition. However, the response was different species by species.

Resource allocation in current year shoot was compared based on Huber value (cross
sectional area of a shoot/total leaf area) between ring-porous and diffuse-porous species. The former had lower HVs than the latter, indicating that ring-porous species can allocate more resources to the photosynthetic organ (leaves) than to the supporting organ (xylem). The reasons were attributable to higher mechanical strength of xylem and more efficient water conductivity of shoots in ring-porous species than those in diffuse-porous species.

d) Developing models of forest harvesting

We are required to study not only environmental sustainability but also economic sustainability for forest resource utilization. Then, we tried to develop a precise forest harvesting models using system dynamics based on observation of actual harvesting operations. We clarified that consideration of dbh distribution of trees to be felled is effective in the precise evaluation of productivity and production costs in applying system dynamics simulation to forest harvesting. Moreover, the addition of processing-time variations is also effective. The new model can estimate the differences in productivity and production costs involved in variations of the thinning method, such as low or crown thinning. Another advantage of using a model that considers diameter distribution and variations in processing time is that it can be applied to the evaluation of productivity and production costs in future harvesting through combination with a forest growth model. This model can therefore be used for long-term evaluation of forest harvesting including thinning methods.

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

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) development of silvicultural process for extensive forestry with early intensive thinning, and (4) relationship between construction costs of forest roads and terrain, were discussed.

A-2. Publications and presentations

a) Publications

Original papers


Reports


Forest Management Project in Hyogo Prefecture (Hasegawa, Otsuka, Sugimoto, and Beppu): A handbook for constructing durable forest roads. 2008 (in Japanese)


Osawa, A., T. Kajimoto, Y. Matsuura, A.P. Abaimov, O.A. Zyryanova, N. Tokuchi, M. Hirobe, K.


b) Conference and Seminar papers presented
Third Conference of East Asian Federation of Ecological Societies (1 presentation)

A-3. Off-campus activities
Membership in academic society (roles)
Hasegawa, H.: Society of Japan Forest Engineering (director), Society of Forest Spatial Utilization (executive), Society of Forest Production (executive)

Research grant
Monbu-Kagakusho Research Grant: Scientific Research (A) (Overseas) Phosphorous limitation in the tropical forest in Borneo: bottom up effect and adaptation of plants (Okada), Scientific Research (A) (Overseas) Ecological research on large-scale bamboo flowering in Mizoram, India. (Hasegawa), Monbu-Kagakusho Research Grant: Scientific Research (B) (Overseas) Inter-relationships between forest stand structure and nitrogen dynamics in Siberian taiga (Osawa PI)

Others: Sumitomo Fundation Environmental Research Grant, Forest fire and vegetation changes in the tropical seasonal forests in Thailand (Okada PI), Ministry of Environment Global Environmental Research Fund (B-053) Carbon accumulation and sequestration in permafrost forest ecosystems (Osawa)

A-4. International cooperation and overseas activities
International meetings (roles)
Hasegawa, H.: IUFRO All-D3-Conference (Organizing Committee)

International joint researches and overseas research survey
Osawa, A.: Inter-relationships between stand development and patterns of nitrogen dynamics in Siberian taiga (Russia),
Osawa, A.: Carbon accumulation and carbon sequestration in permafrost forest ecosystems (Russia)
Osawa, A.: Carbon budget of Canadian boreal forests (Canada),
Hasegawa, H.: Ecological research on the large-scale bamboo flowering in Mizoram, India (India)

B. Educational Activities (2007.4-2008.3)
B-1. On-campus teaching

a) Course given
Undergraduate level: Measuring tropical forests (Okada), Social and environmental changes under sustainable development in Monsoon Asia (Okada), Basic Science for Forest and Biomaterials IV (Osawa), Forest Utilization (Osawa), Tree Physiology (Okada), Mushroom Science (Okada), Reading of Foreign Literature I (Osawa), Reading of Foreign Literature II (Osawa), Seminar in Forest Utilization (Osawa, Okada, Hasegawa), Introduction to Research (Osawa, Okada, Hasegawa), Comprehensive Practice in Forest (Okada, Hasegawa), Practice for Forest Utilization (Osawa, Okada, Hasegawa), Laboratory Course in Forestry and Biomaterial Science IV (Okada, Hasegawa),
Graduate level: Scientific writing and presentation in English (Okada), Seminar in Forest Utilization (Osawa, Okada, Hasegawa), Laboratory course in Forest Utilization (Osawa, Okada, Hasegawa)

B-2. Off-campus teaching, etc.

Open Lecture
Hasegawa, H.: Training Lectures for Foresters in Hyogo (Lecturer), Technical Meeting for Thinning in Tokushima (Lecturer), Technician Training for University Forests in Japan (Lecturer)

C. Other remarks
Osawa, A.: Preparatory committee on Arctic research (Member), Committee on Arctic research (Member)
Hasegawa, H.: Preparatory Committee of Forest Database in North Okayama (Chairman), Forest Management Project Team in Hyogo, Low Cost Forestry Project Team in Wakayama
2.2.5 Laboratory of Forest Biology

Staff
Professor : Isagi, Yuji, Ph. D.
Lecturer : Takayanagi, Atsushi, Dr. Agric. Sci
Assistant Professor : Yamasaki, Michimasa, Dr. Agric. Sci

Students and research fellows
Doctor’s program : (4)
Master’s program : (6)
Undergraduate : (4)
Research student : (1)
JSPS Research fellow : (1)
COE Research fellow : (1)

A. Research Activities (2007.4-2008.3)
A-1. Main subjects

a) Regeneration and genetic structure of tree populations

Pollination is one of the most important processes for the reproduction of plants, and it directly influences reproduction success, fitness and genetic structure of plant population. We developed a novel method that conducts genotyping of a single pollen grain, and the pollination efficiencies of insects that visited the flowers of Magnolia obovata (Magnoliaceae) were evaluated. Most of the pollen adhering to bumblebees was self-pollen suggesting that visitation by bumblebees may cause geitonogamous pollen flow and negatively affect the reproduction of M. obovata. In contrast, flower beetles transported large amounts of genetically diverse outcross pollen. Direct genetic analysis of pollen grains will advance our understanding of plant mating systems and may shed light on the mutualism and coevolution of plants and flower visitors.

b) Biological conservation of organisms of forests

In order to conserve biological diversity of forest, fine genetic markers were developed for a variety of plant species. Analyses of genetic structure and genetic diversity for endangered plant species were conducted. Analysis of genetoc diversity was also conducted for an endangered mammal species, Banteng, in Australia, and its conservation scheme was proposed.

c) 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 Cryptomeria 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. Vegetation change processes were compared between different browsing pressure at herbaceous community dominated by low-preference species. Biomass under several artificial Cryptomeria japonica stands were estimated.

d) Mass mortality of oak trees

The ambrosia beetle, Platypus quercivorus, causes mass mortality of oak trees by transporting pathogenic fungi from trees to trees. Studies on the number of flying male beetle and the number of beetle holes on Quercus crispula of various size revealed positive effects of tree size on the probability of the beetle flying to trees and the probability of the beetle boring holes on
trees. Previous infection history of trees had a significant negative effect on the probability of the beetle boring holes on trees. These results suggest that *P. quercivorus* disregards thinner trees, and flies away from trees with previous infection history after landing on trees.

### A-2. Publications and presentations

a) Publications

**Original papers**


**Books**


b) Conference and seminar papers presented

The Mammalogical Society of Japan 2007 Annual Meeting (4 presentations)
A-3. Off-campus activities

Membership in academic societies (roles)
Isagi, Y.: The Ecological Society of Japan (Ecological Research, Associate Editor-in-Chief: Journal of the Ecological Society of Japan, Editor: Committee for the Natural Conservation), The Japanese Forest Society (Journal of the Japanese Forest Society, Editor), The Society for the Study of Species Biology (Regional Secretary)
Takayanagi, A.: Mammalogical Society of Japan (Audit)

Research grants
Isagi, Y.: JSPS research grant: Kiban-kenkyu B: Analyses of pollination processes of tree species based on genotyping of a single pollen grain (Rep.: Y. Isagi)
Isagi, Y.: JSPS research grant: Kiban-kenkyu B: Evaluation of the effect of forest fragmentation in sub-tropical island ecosystems on species and genetic diversity (Y. Isagi, Rep.: K. Yoneda)
Takayanagi, A.: JSPS research grant: Kiban-kenkyu C: Study on effects of habitat quality and protection fences on crop damage intensity by sika deer (Rep.: A. Takayanagi)

B. Educational Activities (2007.4-2008.3)

B-1. On-campus teaching
a) Courses given
Undergraduate level: Basic Science for Forest and Biomaterials IV (Isagi), Reproductive Ecology in Forest Trees (Isagi), Wildlife Conservation Science (Takayanagi), Laboratory Course in Forest and Biomaterials Science I (Takayanagi), Laboratory Course in Forest and Biomaterials Biology (Takayanagi, Yamasaki), Laboratory Course in Ecology (Takayanagi, Yamasaki), Practice in University Forests II (Takayanagi), Seminar in Forest and Biomaterials Science (Isagi, Takayanagi, Yamasaki)
Graduate level: Forest biology II (Takayanagi), Seminar in Forest Biology (Isagi, Takayanagi), Laboratory Course in Forest Biology (Isagi, Takayanagi)

B-2. Off-campus teaching, etc.

Part-time lecturer
Isagi, Y.: Graduate School of Science, Kobe University (Molecular Ecology), Faculty of Integrated Arts & Sciences, Hiroshima University (Conservation Biology), Graduate School of Integrated Arts and Sciences (Symbiotic Microbial Biology)
Takayanagi, A.: Kyoto Gakuen University (Wildlife Conservation)
Yamasaki, M.: Faculty of Engineering, Doshisha University (Life Science II, Animal Behavior)

Open seminar
Takayanagi, A.: Open Seminar of Field Science Education and Research Center, Kyoto University (Lecturer)

C. Other remarks
Isagi, Y.: Research Institute for Humanity and Nature (project researcher), Hiroshima Prefecture
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 : (4)  Research fellow : (1)
Master’s program : (8)  Research student : (1)
Undergraduate : (4)

A. Research Activities (2007.4-2008.3)
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)  Habitat restoration 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
   Hong, S, Nakagoshi, N., Fu, B. Morimoto, Y. eds.: Landscape Ecological Applications in Man-Influenced Areas, Dordrecht, Springer, 535pp., 2007.1
   Morimoto, Y., Shirahata, Y. eds.: Environmental Design: Conservation and Creation of Landscapes, Tokyo, Asakura Shoten, 212pp., 2007.4.
   Imanishi, J., Morimoto, Y.: Assessment of Natural Environment. in Morimoto, Y., Shirahata, Y.

Original papers
Ooishi, Y. and Morimoto, Y.: Changes in the bryophyte flora in an urban afforested woodland: Journal of the Japanese institute of Landscape architecture71 (5): 577 -580
Ooishi, Y. and Yamada, K.: Liverwort and Hornwort from Is. Rishiri studies(27): 63-72
Horiuchi, M., Fukamachi, K., Oku, H. and Morimoto, Y.: Change of the use of forest resources in satoyama landscape in the western part of Shiga Prefecture between the late Meiji Period and the Taisho Period. LRJ 70(5):563-568

Reports

b) Conference and seminar papers presented
Annual meeting of JALE (1)
Annual meeting of the Ecological Society of Japan (2)
Annual meeting of the Kinki Branch Meeting of the Ecological Society of Japan (1)
Annual meeting of the Bryological Society of Japan (2)
Annual meeting of JILA (3)
Annual meeting of JILA Kansai Branch (2)
Annual meeting of the Japanese Society of Revegetation Technology (5)
IALE World Congress 2007 (4)
IUFRO (1)
International Symposium Preservation and Restoration of Environmental Ecology (2)

A-3. Off-campus activities

Membership in academic societies
Morimoto, Y.: Japanese Institute of Landscape Architecture (Head of Kansai Branch), Japanese Society of Revegetaion Technology (President), Japanese Society of Landscape Ecology (Vice President), Environmental Information Center (Councillor), Science Council of Japan (cooperation member), International Consortium for Landscape and Ecological Engineering (Vice President), Internaional Federation of Landscape Architects – Japan (board member)
Imanishi, J.: International Consortium for Landscape and Ecological Engineering (Editorial Office), Japanese Institute of Landscape Architecture (Editorial Board Member for Technical Report), Japanese Institute of Landscape Architecture Kansai Branch (Secretary and Branch Office), Japanese Association for Landscape Ecology (Expert Member), Japanese Society of Revegetation Technology (Editorial Board Member), Annual Meeting of JSRT (Working Member)

Research grants
Morimoto, Y.: JSPS Grants-in-Aid for Scientific Research. (A) (1) Studies on ground design of hierarchical nature restoration. (delegate: Morimoto, Y., member: Imanishi, J.)
Morimoto, Y.: JSPS Grants-in-Aid for Exploratory Research. Landscape architectural basic study on realization of a plant garden in outer space. (delegate: Matsui, S., member: Morimoto, Y.)
Morimoto, Y.: JSPS Grants-in-Aid for Scientific Research. (A) (1) Interdisciplinary studies on extracting prioritized ecosystems, practical techniques and scientific assessment for nature restoration. (delegate: Morimoto, Y., member: Imanishi, J.)
Morimoto, Y: Funded Research. Surveys for the Independent Forest in Expo’70 park. (Commemorative Organization for the Japan World Exposition ‘70)
Morimoto, Y.: Funded Research. Spiritual care for cancer patients by integrated medicine in Expo’70 park. (Integrated Medicine Planning)
Morimoto, Y.: JSPS Bilateral Joint Research Projects.
Imanishi, J.: JSPS Grants-in-Aid for Young Scientists (B). Assessing vigor conditions of cherry trees using a hyperspectral sensor. (delegate: Imanishi, J.)

A-4. International cooperation and overseas activities

International meetings
Imanishi, A., Yoshida, S., Imanishi, J., and Morimoto, Y.: The factors that affected forest landscape change of the World Heritage Shimogamo Shrine, Kyoto, Japan after the Middle Ages. Proceedings of the 7th IALE World Congress, July 8-12. Wageningen, the Netherlands.744. 2007
Sasaki, T., Morimoto, Y., and Imanishi, J.: Development of trees and soils of the forested area in Expo’70 Park 30 years after reclamation. Proceedings of the 7th IALE World Congress, July 8-12. Wageningen, the Netherlands. 269. 2007
Horiuchi M: The use and management of forest resources in satoyama landscape by local people after the Meiji Period (1868-1912) in the western part of Shiga Prefecture, Japan. IUFRO Conference Woodland Cultures in Time and Space: tales from the past, messages for the future, 2007

B. Education Activities (2007.4-2008.3)
B-1. On campus teaching
a) Courses given
Undergraduate level: Landscape Architecture Part I, II (Morimoto, Y.), Planting Design for Landscape (Imanishi, J. and Morimoto, Y.), 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.)
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.: Instructor of Temple Visits (Tango)


B-3. Overseas teaching

**Students and research fellows from abroad**

(GSGES) Doctor course (1) (Korea), Master course (2) (Malaysia, Korea)

C. Other remarks

Morimoto, Y.: Central Environmental Council (Temporary Members of the Natural Environment Group), Expert Committee for Environmental Research and Technology Promotion of Ministry of Environment, Committee Member of Environment of Osaka Prefecture, Kyoto City Scenic Beauty Committee, Kyoto City Scenic Beauty Consultant, Kyoto City City Planning Board Member, Kyoto City Environment Board Member, Committee Member of City Planning of Osaka Prefecture, Committee Member of the Council of Park and Greenery of Kobe City, Executive Board Member of the Council of Urban Greenery Initiative of Kyoto City, Director of the Promotive Society of Urban Greenery Initiative of Kyoto City, Councilor of Japan Highway Landscape Association, Committee Member of Public Association for Forests and Greenery of Kyoto Prefecture, Chair of Committee of Utilization and Conservation of Yodo Main River, Research Advisor of Organization for Landscape and Urban Greenery Technology Development, Committee Member of Satochi Satoyama Model Projects (Ministry of Environment), Committee Member of Natural Environment of Makioo River Dam (Osaka Prefecture), Committee Member of Town Planning of Kizu District (Academic Research City Promotion Institution), Executive Board Member of NPO Green Environment, Executive Board Member of Natural Environment Restoration Society
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  : (5)
Master’s program : (8)
Undergraduate  : (4)

A. Research Activities (2007.4-2008.3)

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) Hydrologic cycle in forested slopes

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. Seepage into bed rock and seepage along tree trunks and tree roots were observed. Simulation models to explain these phenomena were developed.

d) Sediment movement and integrated sediment management in river system

Sediment production process and sediment movement process in mountain region are investigated. 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) Bedload measurement with hydrophone and pits

New bedload measurement methods; hydrophone and a pit bedload sampler were developed. They have been applied in the field. The data were collected and analized.

f) Debris flow disasters were surveyed in Tarumizu city. Damages of houses and people’s reaction were mainly focused.

g) 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.

h) Development of a debris flow simulator equipped with GUI

A simulator ‘Kanako’ is developed, that evaluate several types of debris flow control structures.
A-2. Publications and presentations

a) Publications

Books

Original papers
Takanashi, K., T. Mizuyama, Y. Nakano: A method for delineating restricted hazard areas due to debris flow. 4th International Workshop Debris Flow Hazard Mitigation, Chengdu, 2007

Wei-Li Liang, K. Kosugi, T. Mizuyama: Heterogeneous Soil Water Dynamics around a Tree Growing on a Steep Hillslope. Vadose Zone J. 6-4, 879-889, 2007

Oda, A., T. Mizuyama, J. B. Laronne, M. Nonaka, M. Matsuoka: Flume experiments to examine hydrophone characteristics, Jour. of the JSECE, 60-5, 66-71, 2008 (in Japanese)


Reviews


Mizuyama, T.: Characteristics of sediment disasters and alarm and evacuation. JSECE 60-6, p. 56-57, 2008 (in Japanese)


b) Conference and seminar papers presented

The 118th annual meeting of Japanese Forestry Society (5 presentations)

2007 annual meeting of Japan Society of Erosion Control Engineering (29 presentations)

Bedload Measurement Workshop (2 presentations)

International Hydraulic Engineering (1 presentation)

International Association of Hydrological Science Conference (4 presentations)
A-3. Off-campus activities

Membership in academic societies (roles)
Mizuyama, T.: Japan Society of Erosion Control Engineering (director, president), Japanese Geomorphological Union (member of committee)
Satofuka, Y.: Japan Society of Erosion Control Engineering (member of editorial committee), Japan Society of Civil Engineering (member of committee), Japan Society for Natural Disaster Science (member)
Kosugi, K.: Japan Society of Erosion Control Engineering (member of committee), Japanese Forestry Society (member), Japan Society of Hydrology & Water Resources (member)

Research grants
Monbusho research grants:
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)
General scientific research (A) (1): Development of a combined rock-soil-plan-atmosphere model, and flood and draught predictions at ungauged mountainous watersheds (Head: Tani, Member: Kosugi et al.)
General scientific research (B): Physical analyses on critical rainfall to trigger shallow landslides (Head: Kosugi, Member: Mizuyama et al.)

A-4. International cooperations and overseas activities

International Meetings
Mizuyama, T: Bedload measurement workshop (Chairman, presentation), International Hydraulic Engineering Research (Presentation)
Kosugi, K: International Association of Hydrological Science Conference (Presentation)

Membership in international academic societies
Mizuyama, T: Editor of Journal of Hydrological Sciences (editor), International Workshop on Debris Flow Hazard Mitigation (member of the International Committee)
Satofuka, Y: IAHR
Kosugi, K.: SSSA, IAHS, IUFRO-J, AGU

International joint researches, overseas research surveys
Satofuka, Y.: Joint Research on control of floods and sediment movement in Semalang, Brantas and Toba Basins (Indonesia)
Kosugi, K.: Joint Research on Integrated Watershed Management for Sustainable Water Use in a Humid Tropical Region (Indonesia)

B. Educational Activities (2007.4-2008.3)

B-1. On-campus teaching
a) Courses given
Undergraduate level: Theory of Erosion Control 1,2 (Mizuyama), Practice in Erosion Control (Mizuyama, Satofuka), Planning of Erosion Control (Mizuyama, Satofuka), Reading of Foreign Literature II (Mizuyama, Satohuka), Special Seminar on Erosion Control 1,2
Graduate level: Theory of sediment induced disaster 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, The University of Tokyo (Sabo works), Fac. Agriculture, Kobe University (Environmental Engineering), Japan International Cooperation Agency (Infrastructure)
Satofuka, Y.: Fac. Engineering, Ritsumeikan Univ. (Hydraulic experiment)

B-3. Overseas teaching
Students and research fellows from abroad
Students from abroad: 2 (Taiwan, Indonesia)
JICA trainee: 1 (Cameroon)

Chair of Biomaterials Technology

2.2.8 Laboratory of Biomaterials Design

Staff
Professor: Nakano, Takato, D. Agric. Sci.
Lecturer: Nakamura, Masashi, D. Agric. Sci.
Assistant Professor: Murata, Koji, D. Agric. Sci.

Students and research fellows
Doctor's program: (3)
Master's program: (6)
Undergraduate: (4)

A. Research Activities (2007.4-2008.3)
A-1. Main subjects
a) Characterization of physical properties of wood: Physical properties of wood such as relaxational behavior, fatigue properties, and water adsorption are affected by ultrastructure and various factors, for example moisture content, temperature and so on. Effects of these factors on physical properties are thermodynamically researched by relating to ultrastructure of wood. Prediction of fatigue life of wood is analytically examined on the basis of various factors associated in fatigue life. Additionally, relationship between adsorption water and the above
properties is also researched.

b) Swelling mechanism of cell wall and physical properties: Swelling behaviour of cell wall with water adsorption is tightly related to physical properties of wood and gives many information. Relationship between adsorption water and swelling behaviour is examined using a model of cell wall. Swelling behaviour of wood and wood cell walls is also visualized and analyzed by using digital image correlation method.

c) 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 is measured using image correlation technique.

d) 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 are tried to use for detecting defects (knot and others), and deflection distribution curves and optical properties are also used for evaluating strength.

e) Properties of wood as sensory stimuli to human: Wood is one of the most friendly and comfortable material for human. Dominant factors of such effects are investigated scientifically and its application to interior designing are studied. For example: i) Investigation on characteristics of wood as visual stimuli, 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 impressions, especially ‘natural’ and ‘comfortable’ images and physical characteristics of visual images. iv) Evaluation of visual inducement of wood by using eye-tracking method.

A-2. Publications and presentation
a) Publications

Books

Original papers


**Patents**

Patent granted


b) Conference and seminar papers presented

The 56th Annual Conference of the Society of Material Science Japan, Nagoya, May 19-20, 2007: 1 presentaions (Murata)

The 57th Annual Meeting of Japan Wood Research Society, Hiroshima, Aug. 8-10, 2007: 9 presentations (Nakano, Nakamura, Murata)


The 57th Annual Meeting of Japan Society of Physiological Anthropology, Fukuoka, Oct. 20-21, 2007: 1 presentation (Nakamura)

The 51st Japan Congress on Materials Research, Kyoto, Nov. 27-29, 2007: 3 presentations (Murata)

The 58th Annual Meeting of Japan Wood Research Society, Tsukuba, Mar. 17-19, 2008: 6 presentations (Nakano, Nakamura, Murata)

**A-3. Off-campus activities**

**Membership in academic societies**

Nakano, T.: The Japan Wood Research Society (Member of the screening committee for the awards, Member of the editorial board)

Nakamura, M.: The Japan Wood Research Society (Member of the committee for information processing, Secretary of the Division of Living Comfort, Member of the working committee for annual meetings); Japan Society of Physiological Anthropology (Trustee for homepage); Wood Technological Association of Japan (Member of the planning committee of Kansai Branch, Member of the editorial board)
Murata, K.: The Society of Materials Science, Japan (Committee member of the Division of Wood Based Materials, Editorial board member of the journal, Member of the planning committee); Wood Technological Association of Japan (Member of the planning committee of Kansai Branch, Member of the committee for fast growing trees of Kansai Branch), The Japan Wood Research Society (Editorial board member of the journal).

Research grants
Nakano, T.: JSPS Grant-in-Aid for Scientific Research (C), Water in wood substance and Swelling properties of Cell wall (Head)
Murata, K.: JSPS Grant-in-Aid for Exploratory Research, Fatigue of wooden blade for vertical axis wind turbines (Head)

B. Educational Activities (2007.4-2008.3)
B-1. On-campus teaching
a) Courses given
Under graduate level: Basic Science for Forest and Biomaterials III (Nakano), Forest and Biomaterials Science III (Nakano), Properties of Biomaterials (Nakano), Wood and Timber Construction (Nakamura), Practice in Biomaterials Design (Nakano, Nakamura, Murata), Information Technology in Forest and Biomaterials Science (Nakamura, Murata), 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: Biomaterials Design II (Nakamura), Seminar in Biomaterials Design (Nakano, Nakamura, Murata), Laboratory Course in Biomaterials Design (Nakano, Nakamura, Murata)

B-2. Off-campus teaching, etc.
Part-time lecturer
Nakano, T: Graduate school of Nagoya University (Wood physics: An intensive lecture)
Nakamura, M.: Graduate school of the University of Tokyo (Wood properties II: An intensive lecture)

Open seminar, etc.

C. Other remarks
Nakano, T.: [Inside campus] Vice Director of Division of Forest and Biomaterials Science, Committee for Educational Affairs of Graduate School of Agriculture, Committee for General Affairs of Students of Department of Agriculture.
Nakamura, M.: [Inside campus] Advisory Board for Information Systems in Faculty of Agriculture; Committee for Computer Literacy in Center of Information and Multimedia Studies; Committee for Environment, Security and Hygiene in Faculty of Agriculture.

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.
Research Assistant (part time) : Fujiwara, Yuko, Dr. Agric. Sci.

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

A. Research Activities (2007.4-2008.3)
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
analysis 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 H₂, CH₄ and CO₂ 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

Original Papers

Original Papers
International Symposium on Conservation of Cultural Heritage in Ease Asia (Souel, Nov. 11.1-2, 2007, p.99-104

**Reviews**


**Reports**


Fujii, Y. (part): Report on attack of dry-wood termites and preserevation technique. (Special Committee on dry-wood termite, the Japan Termite Control Association, Shiroari, No. 147 ; 11-24, 2007


**b) Conference and seminar papers presented**


The 57th Annual Meeting of Japan Wood Research Society (Hiroshima, 2007.8.8-10) : 4 (Okumura, Fujii, Sawada, Yanase, Fujiwara)

The 58th Annual Meeting of Japan Wood Research Society (Tsukuba, 2008.3.17-19) : 5 (Okumura, Fujii, Sawada, Yanase, Fujiwara)


The 51th Japan Congress on Materials Research (Kyoto, 2007. 11. 27-29) : 1 (Yanase)

**A-3. Off-campus activities**

**Membership in academic societies (roles)**

Okumura, S.: The Japan Wood Research Society (director, chairperson of Information Committee), Wood Technological Association of Japan (councilor, director of Kansai Branch)

Fujii, Y.: Wood Technological Association of Japan (Kansai branch, organizing committee), The Society of Materials Science, Japan (director, councilor, editorial committee), Japan Wood Preserving Association (director, committee chair of wood degradation inspector)

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

**Research grants**

Grant-in-Aid for Scientific Research (KAKENHI)

Fujii, Y: Grant-in-Aid for Scientific Research (A),Nondestructive testing of wood and wood based materials using millimeter wave imaging (Representative)

Fujii, Y.:JST Grant for feasibility Study, Development of particulate material from natural minerals as a physical termite barrier and humidity controller
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 (2006.4-2007.3)

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), 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.: Graduate School of Agricultural and Life Science, Tokyo University (Special Lecture for Material and Housing Sciences III)


Fujii, Y.: Workshop on preservation of wooden cultural properties against biodegradation, by National Research Institute for Cultural Properties, Tokyo, 2007.11.19 (Lecturer)

Fujii, Y.: Symposium on reinforcement and maintenance technology for wooden buildings, by Japan Association for Earthquake Engineering, 2007.11.20 (Lecturer)

Fujii, Y.: Program for building technology of wooden houses, by Hyogo Prefecture, 2007.3.7 (Lecturer)

*Open seminar*

Sawada, Y: Kyoto University Open Seminar, “Eat The Forest” (Committee)

B-3. Overseas teaching

*Students and research fellows from abroad*

Student (Doctor course) 1 (Ghana)

C. Other Remarks

Okumura, S.: Councilor, Education and Research Council, Kyoto University; Dean, Graduate School and Faculty of Agriculture, Kyoto University; Technical Development Adviser, Hyogo Prefecture

Yanase, Y., Fujii, Y., Okumura S.: JSMS Award for Scientific Papers 2007
A. Research Activities (2007.4-2008.3)

A-1. Main subjects

a) Processing of Cellulosic Materials Using Magnetic Fields

Using the technique of magnetic processing, we are trying to create novel cellulosic materials in which the alignment and pattern are finely controlled. These materials could show novel properties having mechanical, optical, thermal, and piezoelectric anisotropies.

(i) Filler-in-cellulosic matrix: we prepare 2-dimensional composite materials in which organic, inorganic, and metal particles are precisely aligned and patterned magnetically in cellulosic materials such as paper, cellophane, and films of cellulose derivatives. These composites are expected to exhibit anisotropic mechanical, optical, thermal, and electrical properties.

(ii) Cellulose-as-filler: the sizes of cellulose fibers are controlled from millimeter to nanometer sizes. Depending on their size, they exhibit various physical properties. In addition, by introducing nano particles onto the fiber, further functionalization of fibers can be achieved. By alignment of these fibers using magnetic field, 2-dimensional functional composites will be created.

b) Development of the technique of pseudo-single crystals and its application to diffraction method.

A magnetic method that we have developed enables to fabricate a pseudo-single crystal (PSC) from a powder sample. The obtained PSC gives rise to XRD equivalent to that obtained from a real single crystal. This method (PSC method) will provide the third way, coming after the powder method and the single crystal method in the diffraction methods including X-ray and neutron method. Since the protein structure analysis is becoming important, encouraged by a current trend of biorefinery, we expect an increasing demand to our PSC technique.

c) Paper friction at different atmospheres

Friction of commercial papers under dry, moderate and humid atmospheres was examined, comparing with those of cellulose film and aluminum foil. The friction coefficient between different papers generally gave their intermediate value. The coefficient between equal cellulosic materials including paper increased with humidity, while that of aluminum against aluminum was constant irrespective of surrounding humidity. However the surface wetting with a slight amount of water on aluminum caused rapid increase in the coefficient. The capillary force may cause this phenomenon, and the sharp increase of friction between cellulose films in humid atmosphere was similar to that observed with aluminum foils which were wetted with a slight amount of water. These suggest that the capillary force by a slight amount of water may raise frictional force of cellulosic materials including paper at high humidity.
d) Role of the additives for new function development in paper materials

Laboratory handsheets made from lightly beaten hardwood kraft pulp containing various amounts of cationic type polyacrylamide (PAM) dry strength resin were prepared by both the internal and external application methods. The internal application was performed by adding a dilute aqueous PAM solution to pulp fiber suspension, while the external application was performed by dipping a dry paper (handsheet) into an aqueous PAM solution and further squeezing it out with/without the standard wet press. ATR-FTIR analysis combined with gradual etching method was used to clarify a difference in depth profile of PAM within a fiber wall between these application methods. For the internal application method, PAM existed, on the whole, mainly close to fiber surface and slightly distributed from fiber surface toward the center of fiber wall. On the other hand, in case of external application, PAM existed mainly on fiber surface and around fiber-to-fiber bonds. Dynamic mechanical properties of the papers containing PAM were measured at the temperatures ranging from 100°C to 300°C and at the various frequencies. In case of adding by internal method, no characteristic viscoelasticity of PAM appeared. On the other hand external method addition at the nearly same retention level of PAM gave the characteristic viscoelasticity. These findings suggest following things: when cationic type PAM dry strength resin is applied by the internal method, the PAM may distribute within a fiber wall in molecularly dispersed state. The induced state of PAM within a fiber wall, no existence of a phase of PAM, leads to disappearance of the viscoelasticity of the PAM. On the other hand the external application method brings about the PAM distribution around the fiber-to-fiber bonds as well as over the fiber surface. The induced state of PAM, existence of a kind of PAM phase, leads to appearance of the viscoelasticity of the PAM itself. Dynamic mechanical analysis could be a good method examining whether the PAM is molecularly distributed or making aggregates in paper and other polymer composites.

e) Characterization of recycled paper

In order to examine the sheet strength reduction and the net effect of simple dry-rewetting cycles, handsheets from softwood and hardwood bleached kraft pulps were repeatedly subjected to drying-and-rewetting cycle up to 30 times and were compared with those recycled through the drying-and-rewetting and disintegration processes. The decrease in coarseness of softwood pulp fibres both with and without disintegration was unexpectedly large. Decreases in density and tensile index of the sheets at early recycling were large, while the decreasing rate per cycle of those at over about five times recycling were getting small for both softwood and hardwood pulps except the density of the recycled sheets without disintegration. Although the decreases in density and tensile index of the sheets from recycled softwood pulp at early recycling were smaller than those for recycled hardwood pulp, the decrease in WRV (Water Retention Value) of softwood pulp at early recycling was larger than that from hardwood pulp. Furthermore, the decreases in density and tensile index of the recycled sheets without disintegration at early recycling were smaller than those from recycled pulp with disintegration, however the WRV of the former was larger than that of the latter. These results suggested that the hornification indicated by a decrease in WRV was questionable as the main mechanism for the tensile strength reduction on recycling. Observation of the freeze-dried wet sheets using scanning electron microscopy suggested that a decrease in external fibrillation with increasing of recycle number could affect on the changes in the CSF and WRV and further could partly cause the larger decrease in tensile strength of the sheet from recycled pulp with disintegration. Qualitatively, the
loss of external fibrillation on recycling of hardwood pulp was more significant than that of softwood pulp.

A-2. Publications and presentations
a) Publications

Books

Original papers

Reviews

b) Conference and seminar papers presented
The 2nd Annual Meeting of the Magneto Science Society of Japan, 6 papers
The 51th The Clay Science Society of Japan, 1 paper (invited)
The 2nd workshop of the Magneto-Science Society of Japan, 1 paper (invited)
The 2007 IEEJ National Meeting, symposium, 1 paper (invited)
The 2007 Autumn Research symposium of Fiber Science and Technology Japan, 2 papers
The 74th Symposium on Paper and Pulp Research, 1 paper
A-3. Off-campus activities

Membership in academic societies

Kimura, T.: The Magneto Science Society of Japan (vice president), The Society of Polymer Science, Japan (Polymer Journal, Associate Editor), The Cellulose Society of Japan (Board member)

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)

A-4. International cooperations and overseas activities

Kimura T.: Asia-research center(Nagoya University)
Kimura T.: Japan-France Seminar (Nagoya University)
Kimura T.: International Conference on Magneto-Science (ICMS2007), co-organizer
Kimura T.: 3rd International Workshop on Materials Analysis and Processing in Magnetic Fields (MAP3), Scientific Committee member

International meetings (roles)
Kimura T.: Japan-France Seminar, 1 paper (invited)
Kimura T.: ICRIS 2007 (Kyoto), 1 paper (invited)
Kimura T.: International Cellulose Conference (ICC2007), 2 papers
Kimura T.: International Conference on Magneto-Science (ICMS) 2007: 6 papers including 1 invited

Yamauchi, T.: 2007 International Paper Physics Conference, Gold Coast Australia, (Presentation)

B. Educational Activities (2007.4-2008.3)

B-1. On-campus teaching

Courses given

Undergraduate level: Forest Science II (Kimura) Physical Chemistry in Bio-materials (Kimura), Pulp and Paper (Yamauchi), Laboratory Course in Forest and Biomaterials Science II (Yamauchi), Laboratory Course in the Basic Forest and Biomaterials Chemistry (Yamauchi), Laboratory Course in the Biomaterials Chemistry II (Kimura, Yamauchi), Seminar in Forest and Biomaterials Science (Kimura, Yamauchi)

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

B-2. Off Campus teaching, etc.

Open seminar, etc

Kimura T.: Seminar in Graduate School of Kyoto University (lecturer)

C. Other Remarks

Yamauchi, T: Representative of “Paper Science Forum”
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: (1)
Master’s program: (8)
Undergraduate: (4)

A. Research Activities (2007.4-2008.3)

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 Acetobacter in mediums containing xylan, mannna 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 organelles, 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. In relation to the physiological function and also utilization, distribution and structure of silica were investigated on bamboo, grass and also rice husk.
A-2. Publications and presentations
a) Publications

**Original papers**
Yoshinaga, A., Wada M., Fujita M., Chabbert B., Pilate G. : Modified lignification in the cell walls of CAD depressed poplars. IAWA Journal, 28 (4) ; 457-471, 2007

b) Conference and seminar papers presented
The 57th Annual Meeting of the Japan Wood Research Society: 7 papers
The 58th Annual Meeting of the Japan Wood Research Society: 5 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 (C): Preparation of monoclonal antibody against lignin (Yoshinaga), Grant in Aid for Young Scientists (B): Comprehensive histochemistry of enzymes in hemicellulose biosynthesis using DNA aptamer (Awano)

A-4. International cooperation and overseas activities

*International meetings (roles)*
Takabe: Workshop on Xylogenesis, Korea (Invited speaker)
Yoshinaga : The 11th Cell Wall Meeting, Copenhagen (Participant)
Takabe, Yoshinaga, Awano : The Annual Meeting of International Academy of Wood Science (Local Organizing Committie)

*International joint researches, overseas research survey*
Awano: Using transgenic trees to elucidate the function of hemicelluloses (Sweden)
Yoshinaga: Tension wood formation in transgenic trees with altered lignin metabolism (France)

B. Educational Activities (2007.4-2008.3)

B-1. On-Campus teaching

a) Courses given
Undergraduate level: Basic Forest and Biomaterials Science I (Takabe), Structural and Physiological Biology of Woody Plant Cells (Fujita, Takabe), Formation of Plant Cell Walls (Takabe), Mushroom Science (Awano), Information Technology in Forest and Biomaterials Science (Awano), Reading of Foreign Literature II (Yoshinaga, Awano), Laboratory Course in Forest and Biomaterials Science I (Takabe, Yoshinaga, Awano), Laboratory Course in Forest and Biomaterials Biology (Takabe, Yoshinaga, Awano), Laboratory Course in Ultrastructural Observation of Wood (Takabe, Yoshinaga, Awano), Practice in University Forests I (Takabe, Awano), Seminar in Forest and Biomaterials
Science (Fujita, Takabe)
Graduate level: Tree Cell Biology I (Fujita), Seminar on Tree Cell Biology (Fujita, Takabe), Laboratory Course in Tree Cell Biology (Fujita, Takabe)

B-2. Off-Campus teaching
Open seminar, etc
Takabe: Workshop on adhesion (Lecturer).

2.2.12 Laboratory of Chemistry of Composite Materials

Staff
Professor: Nishio, Yoshiyuki, Dr. Eng. Sci.
Lecturer: Yoshioka, Mariiko, Dr. Agrc. Sci.

Students and research fellows
Doctor’s program: (2)
Master’s program: (7)
Undergraduate: (4)

A. Research Activities (2007.4-2008.3)
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 showing specific functions in some advanced applications and/or adequate conformity with the environment. 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) 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 carbohydrate polymers and lignin derivatives, and (4) the molecular assembly of cholesterol-based lipids, each directed toward the design and fabrication of new, useful functional materials. Concretely, the material functionalities arousing interest include
highly controllable biodegradability coupled with easiness of processing, and further extensions for special uses demanding dynamic controls, e.g., in shape memory-recovery performance or in novel optical, electro-optical, and magnetic functions.

b) Thermoplasticization and Liquefaction of Plant Biomass, and their Applications to High-performance, High-functional Materials

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, foams, and coatings 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.

A-2. Publications and presentations

a) Publications

**Original papers**


**Books**


Reviews

Patents
Patent granted

b) Conference and seminar papers presented
The 56th Annual Meeting of the Society of Polymer Science, Japan (Kyoto), 5 papers
The 14th Annual Meeting of the Cellulose Society of Japan (Shizuoka), 3 papers
The 57th Annual Meeting of the Japan Wood Research Society (Hiroshima), 2 papers
The 52nd Lignin Symposium (Utsunomiya), 1 paper
The 58th Annual Meeting of the Japan Wood Research Society (Tsukuba), 3 papers
2nd International Cellulose Conference (ICC2007) (Tokyo), 6 papers (including 1 invited paper)
European-Japanese Workshop on Cellulose and Functional Polysaccharides (Kyoto), 1 paper (invited)
33rd Meeting of the Research Association on Fiber Precessing Technologies (Osaka), 1 paper (invited)
53rd Summer College of the Society of Polymer Science, Japan (Hokkaido), 1 paper (invited)
51st Congress on Materials Research in the Science Council of Japan (Kyoto), 1 paper (invited)
71st Seminar of the Association of Organic Device Research (Nagoya), 1 paper (invited)
Pre-symposium of ACS Cellulose & Renewable Materials Division Symposia (Uji), 1 paper (invited)
Special Meeting on New Fiber Developments in the Japan Chemical Fibers Association (Tokyo), 1 paper (invited)
The 3rd workshop and the seminar on environment, Research and Development Center of Bamboo Resource (Kyotanabe), 1 paper (invited)

A-3. Off-campus activities
Membership in academic societies (roles)
Nishio, Y.: The Cellulose Society of Japan (Vise President), The Society of Fiber Science and Technology, Japan (Councillor), Wood Technological Association of Japan: Wood-Plastic Composite Materials Committee (Auditor; Academic Advisory Panel of Wood-Plastic Composite Materials Committee)
Yoshioka, M.: The Japan Wood Research Society (Member of Editorial Board, Member of Committee for Strengthening and Setting up the Studies of The Japan Wood Research Society, Member of Working Group for Formulation of Educational Contents), The Society of Materials Science, Japan (General Organizer of Polymer Materials Section Committee), Wood Technological Association of Japan (Academic Advisory Panel of the Wood-Plastic Composite Materials Committee, Organizer of the Plywood Committee),
The Society of Polymer Science, Japan (Member of Steering Committee for Research Group of Ecological Materials)

**Research grants**
Monbu-Kagakusho/JSPS Research Grants:
Grant-in-Aid for Scientific Research (B), Structural Relaxation Characteristics and Functions of Liquid-Crystalline Glasses of Polysaccharides and Lipids (Head, Nishio; Co-researcher, Yoshioka)
Grant-in-Aid for Scientific Research (C), Nanostructure control and Function Expression of Sugar biomass derivatives / Clay composite materials (Head, Yoshioka; Co-researcher, Nishio)

**Others:**

**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 2007 International Symposium on Nano-fibers, Member of Organizing Committee; International Cellulose Conference 2007 (ICC 2007 Tokyo) (Member of Organizing Committee); European-Japanese Workshop on Cellulose and Functional Polysaccharides 2007 (Chairman of Organizing Committee & Chairman of Managing Committee); Pre-symposium of ACS Cellulose & Renewable Materials Division Symposia (Organizer); American Chemical Society, Cellulose & Renewable Materials Division, Anselme Payen Award Symposium (Organizer)
Yoshioka, M.: The 10th Pacific Polymer Conference (PPC 10), (Oral presentation)

**B. Educational Activities (2007.4-2008.3)**

**B-1. On-campus teaching**

a) Courses given
Undergraduate level: Forest and Biomaterials Science II (Nishio), Polymer Synthetic Chemistry (Nishio), Physical Properties of Polymers (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.: Graduate School of Agriculture, Kyoto Prefectural University (Physical Properties of Polymers)
Yoshioka, M.: Kyoto Study Center of The Open University of Japan (Materials Chemistry of Biomass Composites)

C. Other Remarks
Nishio, Y.: Committee Member of JSPS (Japan Society for the Promotion of Science)
Yoshioka, M.: Committee Member of JSPS (Japan Society for the Promotion of Science)

2.2.13 Laboratory of Chemistry of Biomaterials

Staff Professor: Nakatsubo, Fumiaki, Dr. Agric. Sci.
Associate Professor: Takano, Toshiyuki, Dr. Agric. Sci.
Assistant Professor: Kamitakahara, Hiroshi, Dr. Agric. Sci.

Students and research fellows
Doctor's Program: (3)
Master's Program: (8)
Undergraduate: (4)

A. Research Activities (2007.4-2008.3)
A-1. Main subjects

a) Chemical syntheses of oligo- and polysaccharides and their function

Research in our laboratory encompasses the development of photo-current cellulosic materials for a new artificial photosynthesis system, the synthesis of reducing end modified cellulose derivative and its properties, the syntheses of regio-substituted oligosaccharides and their surfactant abilities, the preparation of enzyme immobilized amino-cellulose and its properties, immobilization of tannin component to cellulose, and the evaluation system of peeling reaction using cello-oligosaccharides.

b) Reactivity of lignin

The elucidation of peculiar behavior of sinapyl alcohol in the dehydrogenative polymerization (lignin formation) using γ-substituted monolignol derivatives, and the analysis of the products in the dehydrogenative polymerization of alkyl ferulate are currently being investigated to obtain fundamental knowledge of the dehydrogenative polymerization of lignin. The electronic oxidation of lignin model compounds for pretreatment of Kraft pulping, the synthesis of β-5 type lignin oligomers are also being investigated.

c) Chemical syntheses of the extractive and their utilization

Other targets of current interest include preparation of condensed-tannin from taxifolin, which is one of the components in heart wood of Larix species, and evaluation of its anti-oxidant. We are developing a new functional polymer with galloyl group as a pendant.

d) Chemical modification of wood

A chemical modification method of wood using super-critical carbon dioxide as a green process is also being investigated.
A-2. Publications and presentations

a) Publications

*Original papers*


*Patent*

Patent pending/applied for

Patent no. JP 2007126976, patentee: Nakatsubo, F., Sakakibara, K., Ogawa, Y., registration date: May.11, 1007


*Review*


*Reports*

Takano T.: European-Japanese Workshop on Cellulose and Functional Polysaccharides 2007, Cellulose Communication 15(1) 40-41
Takano T.: The 13th Cellulose micro-symposium report, Cellulose Communications 15(1) 42-44
b) Conference and seminar papers presented
The 14th Annual Meeting of the Cellulose Society of Japan (Shizuoka, 2007.7.19-7.20), 2 papers
The 57th Annual Meeting of the Japan Wood Research Society (Hiroshima, 2007.8.8-8.10) 4 papers
The 21th Chitin and Chitosan symposium (Kobe, 2007.7.26-27) 1 paper
The 5th Sekisui Chemical Co. Forum (Kyoto, 2007.10.17) 1 paper
The 2nd International Cellulose Conference (Tokyo, 2007.10.22-10.25) 5 papers
European-Japanese Workshop on Cellulose and Functional Polysaccharides 2007 (Kyoto, 2007.10.29-10.31) 1 paper
The 2nd Symposium on Future of Polysaccharides (Nagoya, 2007.11.2) 1 paper
The 52th Lignin Symposium (Utsunomiya, 2007.11.14-11.14) 2 papers
The 58th Annual Meeting of the Japan Wood Research Society (Tsukuba, 2008.3.17-3.19) 3 papers

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 Cellulose Society of Japan (Kansai regional committee)

Research grants
Monkasho Research Grant:
Nakatsubo, F.: Basic Research (B) General “Molecular design of the photo-induced electron transfer super material from cellulose and its development for utilization” (Nakatsubo: head, Takano, Kamitakahara: coworker)
Takano, T.: Basic Research (C) General “Preparations of new functional DHPs from γ-substituted monolignol derivatives.” (Takano: head, Nakatsubo, Kamitakahara: coworker)
Kamitakahara, H.: Young Scientists (A) “Preparation of nano-particles from cello-oligosaccharaides and their dynamic functionalities.”

NEDO grant:
Nakatsubo, F.: Funding for the practical application of the university outcomes, Development of the technology for the production of modified bio-nanofibers and their utilization, (Co-researcher)
Nakatsubo, F.: Grant for the production of organic electronics devices (Investigator)
Nakatsubo, F.: Preliminary Investigation for the International Co-operative Research, the investigation on the availability of biomass resources as raw materials for bio-nanofibers, (Co-researcher)
Takano, T.: Preliminary Investigation for the International Co-operative Research, the investigation on the availability of biomass resources as raw materials for bio-nanofibers, (Co-researcher)

JSPS grant:
Kamitakahara, H.: JSPS Bilateral Joint Projest between Japan and Germany “Development of
novel pathway for cellulose derivatives with both regiospecific and blockwise substitutions and their structure-property relationships”

A-4. International cooperations and overseas activities

International meetings
Nakatsubo F.: The 2nd International Cellulose Conference (Tokyo, 2007.10.22-10.25) (Executive Committee)
Nakatsubo F.: International Academy of Wood Science 2007 Annual Meeting (IAWS2007), (Kyoto, 2007.10.25-27) (Organizing committee: Chairman)
Nakatsubo F.: European-Japanese Workshop on Cellulose and Functional Polysaccharides 2007 (Kyoto, 2007.10.29-10.31) (Organizing committee: invited lecturer)
Takano T.: European-Japanese Workshop on Cellulose and Functional Polysaccharides 2007 (Kyoto, 2007.10.29-10.31) (Organizing committee: Secretary General)
Takano T.: International Academy of Wood Science 2007 Annual Meeting (IAWS2007), (Kyoto, 2007.10.25-27) (Local organizing committee)

Memberships in international academic societies
International Academy of Wood Science (Fellow), Cellulose (Editorial committee), J. Wood Chem. Technol. (Editorial committee)

International joint research, overseas research surveys
Nakatsubo F.: the investigation on the availability of biomass resources as raw materials for bio-nanofibers (Thailand), NEDO (2008.2.16-22)
Takano T.: the investigation on the availability of biomass resources as raw materials for bio-nanofibers (Thailand), NEDO (2008.2.16-22)
Kamitakahara, H.: JSPS Bilateral Joint Project between Japan and Germany “Development of novel pathway for cellulose derivatives with both regiospecific and blockwise substitutions and their structure-property relationships”
Kamitakahara, H.: JSPS Bilateral Joint Project between Japan and Germany (Jena) (2008.3.3-3.14)

Scholars from abroad
Research fellow of JSPS (short term) (2006.5.31-2007.4.30) Dr. Christian Adelwöhrer (from Austria)

B. Educational Activities (2007.4-2008.3)

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 II (Takano), Scientific writing and presentation in English (Takano), Seminar in Biomaterials Chemistry (Nakatsubo, Takano,
C. Other remarks
Takano T: Sanitary supervisor

Chair of Forest Resources (Field Science Education and Research Center: FSERC)

2.2.14 Laboratory of Forest Information

Staff
Professor: Takahito, Yoshioka Dr. Sci.
Associate Professor: Shiba, Masami, Dr. Agric. Sci.
Lecturer: Nakashima, Tadashi, Dr. Agric. Sci.
Lecturer: Nishimura, Kazuo, Dr. Agric. Sci.
Assistant Professor: Sakanoue, Nao, Dr. Agric. Sci.

Students and research fellows
Master’s program: (3)
Undergraduate: (2)
Research student: (1)

A. Research Activities (2007.4-2008.3)

A-1. Main subjects

a) Material cycles in forested watersheds

Surveys on effects of changes in forest environments on watershed environments have been conducted from the viewpoint of the dynamics of material cyclings in the forest, soil and aquatic ecosystems. In order to elucidate characteristics on water discharge and soil/sand erosion from a naturally regenerated forest, temporal and yearly variations in inorganic and organic particles flowing down in streams were observed with a weir and particle traps. Relationship between organic matter and nutrient salts concentrations were used for analyzing the material cyclings in the forest-soil-stream systems.

b) Management of forest resources and timber trade strategies

Taking the sustainable management of forest resources into consideration, the importance of the precise evaluation and monitoring for forest resources is increasing. We conducted integrative and practical surveys on the quantitative evaluation of multi-functions of forest and on the development of forest resource management strategies and timber production technologies. Strategic surveys on the forest certification and those on the timber production, processing and trades, and the forest resource monitoring system based on GIS/image processing have been investigated.

c) Interactions between humans and natures

Relationships between multifunction of an environment and people’s value judgment have
been investigating in order to clarify interactions between humans and natures. Biogeochemical simulation models have been developed to predict environmental changes in a forested watershed environment to tree cutting impacts. People’s preferences on tree cutting scenarios were estimated by a choice experiment using predicted environmental changes. This study is a collaborative project supported by the Research Institute for Humanity and Nature.

A-2. Publications and presentations

a) Publications

Books

Original papers


**Reports**


Shiba, M.: Impression of memorial symposium of German Prime Minister Menkeru visit to Japan 10 years from Kyoto Protocol Adapt. Forest Technology No. 787, p.24-25, 2007 (in Japanese)


b) Conference and seminar papers presented

The 119th Annual Meeting of Japan Forest Society: 8

Annual Meeting of The Japan Forest Engineering Society 2008: 2

The 54th Annual Meeting of The Japanese Society of Group Dynamics: 1

Annual Meeting of Society of Environmental Science, Japan 2008: 3

The 55th Annual Meeting of Ecological Society of Japan: 1

Symposium of the Eco Material Forum: 1

Symposium on the recent status and subjects on the long-term ecosystem monitoring: 1

Annual Branch Meeting of Japan Forest Society: 1
A-3. Off-campus activities

Membership in academic societies

Shiba, M.: Kyoto University Branch of JFTA (Chief), The Japan Forest Engineering Society (Director), Branch of Japanese Forest Society (Editorial board member)

Yoshioka, T.: The Japanese Society of Limnology (Councilor)

Research grants

JSPS Research Grant: Grant-in-Aid for Scientific Research (C) (2): Dynamics and environmental preservation role of natural old stands. (Nakashima, T., head), 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, M., head), Grant-in-Aid for Scientific Research (A) (1): Study on the procurement of vegetable materials for repair of wooden constructions as cultural property. (Sakanoue, N., Co-researcher)

A-4. International cooperations and overseas activities

International meetings (roles)

Shiba, M.: International Precision Forestry Symposium, Stellenbosch University, South Africa (Chairperson/presenter), International Conference on Ecological Restoration in East Asia, Osaka, Japan (Presenters), Council on Forest Engineering 29th Annual Meeting, Fortuna CA, USA (Presenter), Austro2007/FORMEC’07, Vienna, Austria (Presenter), 2007 IUFRO All Division 5 Conference, Taipei, Taiwan (Presenter)

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 COFE, USA, FSC International (Japanese member), ISTVS (Japanese member), FSC forest certifiers (Japanese adjudicator)

B. Educational Activities (2007.4-2008.3)

B-1. On-campus teaching

a) Courses given


Graduate level: Special lecture on Forest Information Science II (Shiba, M.), Seminar on Forest
Information Science (Yoshioka, T., Shiba, M., Nishimura, K., Nakashima, T. and Sakanoue, N.), Laboratory course in forest information (Yoshioka, T., Shiba, M., Nishimura, K., Nakashima, T. and Sakanoue, N.)

B-2. Off-campus teaching, etc.

Part-time lecturer
Nakashima, T.: Kyoto University of Education (Practice of Cultivation and Breeding)
Sakanoue, N.: Shimizu branch of Arida-cho High School, “Woods Science” (Lecture)
Shiba, M.: Faculty of Agriculture, Kyoto Prefecture University (Biosphere resource management), Faculty of Agriculture, Ehime University (Forest operational environment), Japan Green Resources Agency, Kansai and Hokuriku Management Regions (Timber harvesting and transport systems)
Yoshioka, T.: University of Human Environments (Basic biology A and B), Nara University of Education (Special lecture on Ecological Science)

Open seminar
Shiba, M.: Kyoto Univ. For., Open Seminar, Structure and function of Forests (Lecture), Nature experience class of elementary schools in Miyama (Lecture), University local open special project (Lecture), Forest experience practice program of Kitakuwada high school (Lecture), Senior campus (Lecture), Kyoto University technical training program for staff (Lecture), Field training practice of Japan Green Resources Agency, Kansai and Hokuriku Management Regions (Lecture), Nature observation in Ashiu forests (Lecture)
Sakanoue, N.: ANA “Aozora-juku: Watashi no Aozora, Asahi Forest” (Lecture)
Yoshioka, T.: Open Seminar in the Ashiu Experimental Forest “Structure and function of Forests” (Chief organizer, Lecturer), KBS Kyoto TV program “Kyoto Cha-cha-cha’ Values of Environments’ (Lecturer), Open Seminar of ANA “Aozora-juku: Watashi no Aozora, Yaotsu Forest” (Lecturer), The 4th Clock Tower Open Seminar (Main host)

C. Other remarks
Shiba, M.: Mie Prefecture Environmental Conservation Agency (Technical advisor), World Wide Fund For Nature, Japan (Council member of forest management system), TOMIMURA Environment Research Institute (Technical advisor), NPO Forsta (Director), FSC National Initiative
Sakanoue, N.: Forest Committee of Shiga Prefecture (Member)
Yoshioka, T.: Cooperative Researcher in the Research Institute for Humanity and Nature, Japan Wildlife Research Center (Working group member for the Monitoring Site 1000 for freshwater ecosystem)
2.2.15 Laboratory of Silviculture

Staff

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

Students and research fellows

Doctor’s program : (3)
Master’s program : (6)
Undergraduate : (1)

A. Research Activities (2007.4-2008.3)
A-1. Main subjects

a) Satoyama management

At present Satoyama woodlands especially in urban fringe area are noticed as the target to restore their management, ecosystem and biodiversity. To consider these theses researches of forest vegetation and biodiversity, monitoring of environmental characteristics of managed woodlands, discussion of restoration methods, ecological research of bamboo forest and so on are practiced.

b) Regeneration and dynamics of forest

The establishment of forests and the distribution of tree species are influenced by climate, soil and topography, or natural disaster, artificial disturbance, animal, insect, disease, and the like. Main theme of this study is to clarify the relationship between various environmental factors and dynamics of forest by long-term research of stand structure, diversity, growth and regeneration for natural forest, secondary forest, man-made forest and urban forest of warm-temperate zone, cool-temperate zone and subarctic zone in Japan.

c) 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.

d) 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 for 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

**Original papers**


**Reports**


Shibata S.: Effort to the degradation of bamboo forest in Japan and provision against it, Text for the forum “New utilization of bamboo resources”, 2-5, 2007


122

of bamboo *Melocanna baccifera* in Mizoram, India. 2. Condition of bamboo forest before gregarious flowering, Proc. 118th Mtgs Japan Forest Society, 2007

Ikeda K., Kanzaki M. & Shibata S.: Flowering of bamboo *Melocanna baccifera* in Mizoram, India.


Ando, M.: Influence of Climate Change on the Decrescence of *Fagus* species at a Large Scale and Long Term Plot. 94th RISH Symposium, Research Institute for Sustainable Humanosphere, 24-28, 2008


b) Conference and seminar papers presented
Shibata: Annual meeting of 118th Japan Forest Society (4), Annual meeting of Japanese Society of Revegetation Technology (1), Annual meeting of Japan Association of Agricultural System (1), Annual meeting of Japan Institute of Landscape Architecture (1), Annual meeting of Society of Agricultural Planning (1), Annual meeting of Ecological Society of Japan (2), Annual meeting of 118th Japan Forest Society (2)
Sakimoto: The 55-th Annual Meeting of Ecological Society of Japan (1), The 119-th Annual Meeting of Japanese Forest Society (2)

A-3. Off-campus activities
Membership in academic societies
Shibata, S.: Jpn. Inst. Landscape Architecture (Directors, Associate chairman of special journal, Review committee member), Jpn. Soc. Revegetation Technol. (Directors, Chairman of environmental forest section, Member for the selection of award, International community committee member), Ecological Society of Japan (Editorial member of Japanese Journal of Conservation Ecology)

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 institute of development of environmental resources (Vice-chairman)

Research grants
Shibata, S.: 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.), Grant-in Aid for Scientific Research: Basic Research (A) (2); Academic research of scientific estimation, restoration methods and abstraction of important ecosystems (Shibata part)
Ando, M.: Grant-in Aid for Scientific Research: Basic Research (C); Recovery of the forest landscape behind world's cultural heritage in Kyoto (Ando rep.), Kyoto City Grant; Vegetation Research of Forest around Hacchou-daira swamp, 2007 (Ando rep.), Japan Wildlife Research Center Grant; Study for the Long-term Change of the Forest Ecosystem (Ando rep.)
Tokuchi, N.: Grant-in Aid for Scientific Research: Basic Research (B); Mechanism of nitrogen saturation with forest development and its evaluation by PnET-CN (Tokuchi rep.), Grant-in Aid for Scientific Research: Basic Research (B) (2); Evaluation method of environmental influences in forested ecosystem Using model of stream water chemistry (Tokuchi part.)

A-4. International cooperations and overseas activities
International meetings (roles)
Shibata, S.: 4th International Symposium of Preservation and Restoration of Environmental Ecology (presentation), Ceremony for the finish of JICA cooperation project of CENEED
Membership in international academic societies
Shibata S.: World Bamboo Organization (Board member)

International joint researches, overseas research surveys
Shibata, S.: Survey of flowering 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), Ecological research of Miombo forest (Zambia), Bamboo resource research in southern Africa (Malawi), Bamboo resource research in Luzon Island (Philippine), Vegetation research in North-eastern China (China), Support of tree planting activity in central Thailand (Thailand)

Ando, M.: Study for the Vegetation of Semi-arid region (China)

B. Educational activities

B-1. On-campus teaching
a) Courses given
   Undergraduate level: Planting design for landscaping (Shibata & Morimoto), Silvology (Sakimoto), Silviculture (Shibata, Sakimoto, Tokuchi), Forest Botany (Ando), Laboratory Course in applied Forest and Biomaterials Science (Ando), Practice of University Forest III (People and Nature of East Hokkaido) (Ando), Practice of University Forest IV (Natural Environment of Cold Winter Period of East Hokkaido) (Ando), Basic Science for Forest and Biomaterials II (Ando and Sakimoto), Practice of Biological and Environmental Science I (Sakimoto and Ando), Science of Biosphere - Life, Food and Environment (Ando and Tokuchi), Regeneration and Dynamics of Forests (Ando), Exercises in Ecological Interactions between Forest and Coastal Area C (Ando), Exercises in Ecological Interactions between Forest and Coastal Area B (Tokuchi), Forest Science (Ando) Training of Research Method I (Kawamura, Ando), Practice of Biological and Environmental Science I (Sakimoto),
   
   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), Insistence of global environmental studies (Shibata et al.)

B-2. Off-campus teaching, etc.

Part-time lecturer
Shibata, S.: Kyoto College of Art (Correspondence course, Landscape Design and Nature conservation)

Open seminar, etc
Shibata, S.: Spring and Autumn Open Lecture of Kyoto Univ. (lecture), 4th Neo Nishiyama Cultural Forum (lecture), Lecture course of Association of Natural Environment conservation of Osaka Pref. (lecturer), ANA Blue Sky Lecture in Thailand (lecture), Open Seminar of Faculty of Agriculture, Kyoto Univ. (lecture), Forum for utilization of bamboo resources in Forestry and Agriculture Center in Shimane Pref. (keynote speech), Bamboo Linkage project of Kyoto Univ. (lecture), Regular meeting of Kyoto Univ. Club, Osaka (lecture), 48th annual meeting of Japan Bamboo Association in Nagano (keynote speech),
Open seminar of Kamigamo Experimental Station (lecture), Lecture course of Awaji Landscape Planning and Horticulture Academy (lecturer), 7th Junior School of Eco; Field study (lecture), Eco-products 2007 (lecture), Regular meeting of Kochi Biomass Study (lecture), Senior Nature College 2007 (lecture), Restoration Project of Ide Town, Kyoto (comment), Workshop for woody biomass energy in Kochi (lecture), Workshop for research of Niyodo river in Ikenoura fishermen’s cooperate (report), Cultural School of Kochi Newsletter (lecture), 4th open dialog meeting in Kyoto University Clock Tower (report), Forum for effective use of bamboo resources in Kumamoto Pref. (lecture), Forum of forest and green (lecture)

Sakimoto: Open Seminar in Ashiu Forest Research Station (Lecture), Open Campus for Students of Senior High School

C. Other remarks
Shibata, S.: Member of committee for the preservation of cultural landscape of Residential woodland in Tonami (Agency of Cultural Affairs), Member of committee for evaluation of research project (Forestry and Forest Products Research Institute, Kansai Branch), President of CENEED (Centre for Nepal of Environmental and Educational Development) Supporting Group, Member of committee for promotion provision of non-timber products (Agency of Forestry), Member of committee for promotion of flood control and disaster control project (Disaster Control Research Corporation), TV interview: Asahi TV (2007.7.27), Newsletter interview: Kyoto Newsletter (2007.6.27)

Ando, M.: Special Committee of the Meeting for the Promotion of the Forest of Traditional Culture in Kyoto, Director of Sakamoto Shougakkai, Representative of Exploratory Research on Humanosphere in 2007, Research Institute for Sustainable Humanosphere in Kyoto University, Committee of Forest Promotion in Shibecha-cho, Committee of Revegetation in Shibecha-cho
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: (2)
Master’s program: (1)
Postdoctoral Fellow: (4)
Research Staff: (2)

A. Research Activities (2007.4-2008.3)

A-1. Main subjects

a) Structure and Function of Plant Macromolecules
   Biogenesis, structure and function of plant macromolecules, especially cellulose, are studied by using state of art of electron microscopy together with in vitro biosynthesis technique.

b) In vitro synthesis of cellulose and cell wall-polysaccharides
   Biosynthesis of cellulose is hardly clarified. In order to elucidate it, isolating and reconstituting the cellulose-synthesizing activity in vitro are put into action with plants or cellulose-producing organisms. Related polysaccharides like (β1→3)-D-glucan is studied as well. Special attention is paid to the fiber formation.

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. Man-Wood relation can thus be studied by identifying species used in old wooden building and wood statues. Especially, projects that stem from our unique collection of aged wood from national cultural heritages are of increasing interest.

A-2. Publications and presentations

a) Publications

Original papers
Amano Y, Viability and cellulose synthesizing ability of Gluconacetobacter xylinus cells under high-hydrostatic pressure, Extremophiles, 11, 693-698, (2007)


b) Conference and seminar papers presented

49th Annual meeting of Japan Society of Plant Physiologist (2)
14th Annual meeting of the Cellulose Society of Japan (4)
58th Annual meeting of the Japan Wood Research Society (13)

A-3. Off-campus activities

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

Research grants
Sugiyama Junji: Grant-in-Aid for Scientific Research (A) "In vitro synthesis of cell wall polysaccharides and their characterization" (coordinator)
Sugiyama Junji: Funding for the practical application of the university outcomes, Development of the technology for the production of modified bio-nanofibers and their utilization, NEDO(Co-researcher)
Sugiyama Junji: Grant for the production of organic electronics devices, Industrial-University Comprehensive Alliance (Investigator)
Baba Kei’ichi: Grant-in-Aid for Scientific Research (C) “Cell wall ultrastructure of transgenic poplar for some glycosyl hydrolases” (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

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
Sugiyama J.: In vitro synthesis of cell wall polysaccharides (Sweden)

Scholars from abroad
1 Postdoctoral fellow
2 Foreign cooperative researchers (KTH (Sweden), NTNU(Norway))

B. Educational Activities (2007.4-2008.3)
B-1. On-campus teaching
a) Courses given
Graduate level: Graduate school of Agriculture (Sugiyama)

B-3. Overseas teaching
Sugiyama, J: Summer school in Sustainable Humanosphere Science (Chibinon, Indonesia)

C. Other remarks
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: (3)
Doctor’s program: (1)
Master’s program: (4)

A. Research Activities (2007.4-2008.3)
A-1. Main subjects
a) Extraction of cellulose nanofibers from wood and agricultural wastes
b) Development of cellulose nanocomposites
c) Production of high performance materials based on bacterial cellulose
d) Utilization of cellulose nanofiber for organic electronic devices
e) Investigation of the moisture adsorption properties of wood and related materials
f) Studies on house climate
   Regulation mechanism of temperature and humidity in wooden house is investigated.
g) 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.: Cellulose Nanofiber Composites, Advance in Cellulose Utilization, p258-266, CMC publishing, Tokyo, 2007


**Original papers**


Abe, K., S. Iwamoto and H. Yano: Obtaining Cellulose Nanofibers with a Uniform Width of 15 nm from Wood. Biomacromolecules, 8(10), 3276-3278, 2007


**Reviews**


Yano H.: Wood for Musical Instruments, KOBUNSHI, 56(8) ; 614-618, 2007


**Reports**


Yano H.: Report on the Inter-University Collaborative Programs (Wood Composite Hall),
“Cellulose nanofiber from Plant Sources”, March 2008
Tanaka F.: Molecular simulation of biopolymers — Elastic modulus of cellulose crystallite along the each principal axis —, 2007 Super Computer Laboratory Report, Institute for Chemical Research, Kyoto University, p.95, 2008

**Patents**

**Articles, Newspaper and TV program**
Yano H.: 「Development of bionanofiber materials」 2007 March 10th, Nikkei Shimbun
Yano H.: 「Bionanofiber materials as strong as steel」 2007 March 11th, 12th, Nikkei Business Daily
Yano H.: 「Automobile using light and high strength plant resources-based materials」 2008 February 15th, Yomiuri Shimbun

b) Conference and seminar papers presented
The 57th Annual Meetings of the JWRS (8 presentations, Yano, H.)
The 58th Annual Meetings of the JWRS (8 presentations, Yano, H.)
14th Annual meeting of cellulose society of Japan (4 presentations, Yano, H.)
2nd International Cellulose Conference (6 presentations, Yano, H.)
Gordon Research Conference Composites (1 presentation, Yano, H.)
Annual meeting of the Society of Fiber Science and Technology, Japan (2 presentations, Yano)
The 56th Annual meeting of the Society of Materials Science, Japan (2 presentations, Yano)
The 56th Annual meeting of the Society of Polymer Science, Japan (1 presentation, Yano)
Seminar of Wood-based Materials Division, the Society of Materials Science, Japan (1 presentation, Yano)

**A-3. Off-campus activities**

**Membership in academic societies**
Yano H.: Member of The Japan Wood Research Society, Member of 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
Tanaka F.: Member of The Society of Polymer Science, Japan, Member of The Society of Fiber Science and Technology, Japan, Member of the Crystallographic Society of Japan, Member of Society of Computer Chemistry, Japan, Member of The Japanese Society of Carbohydrate Research, Member of The Cellulose Society of Japan, Member of The Society of Cyclodextrins, Japan

**Research grants**
Yano H.: Grant for the production of organic electronics devices (Investigator)
  Funding for the practical application of the university outcomes, Development of the technology for the production of modified bio-nanofibers and their utilization, NEDO(Head Investigator)
Preliminary Investigation for the International Co-operative Research, the investigation on the availability of biomass resources as raw materials for bio-nanofibers, NEDO (Head Investigator)

Morooka T: Grant-in-Aid for Scientific Research (C) (2), Moisture adsorption of wood above 100C (Head Investigator)

A-4. International cooperations and overseas activities

*International joint researches, overseas research surveys*

Yano H.: the investigation on the availability of biomass resources as raw materials for bio-nanofibers, NEDO


Yano, H.: The 10th Pacific Polymer Conference (Invited speaker) (2007.12.4-7)

*Scholars from abroad*

1 JSPS postdoctoral fellow

B. Educational Activities (2007.4-2008.3)

B-1. On-campus teaching

a) Courses given

Undergraduate level: Wood Composite Products (Yano)

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 (Yano et al)

B-2. Off-campus teaching, etc.

*Open seminar, etc*

Yano H.: Seminar for Industrial Technology Center of Kyoto Municipal Industrial Research Institute (Lecturer), The 75th RISH Humanosphere Symposium (Lecturer, Coordinator), SocialNetwork for Biomas Industry Kyoto Biomas School (Lecturer), Kyoto University Open Seminar “Forest, Wood and Life” (Lecture), Seminar of the Adhesion Society of Japan in Osaka (Lecturer), The 34th Symposium for Physical Properties of Food (Lecturer), Seminar for New Materials and New Technology Study Group (Lecturer), Seminar of Carbonized Materials Study Group (Lecturer), Seminar of the Adhesion Society of Japan in Tokyo (Lecturer), Seminar for Advanced Functional Materials Study Group. KinkiChemicalSociety (Lecturer), Seminar for Water and Membrane Study Group, The Society of Polmer Science (Lecturer), Activated Charcoal Study Group Seminar (Lecturer)
**Part-time Lecturer**
Yano H.: Special Lecture for Bio-Science Course, Kinki University (Lecturer)

**B-3. Overseas teaching**

**Lectures and seminars**

Yano H.: “Cellulose nanocomposites”, Indonesian Institute of Science (Indonesia, Lecturer)
Yano H.: “Cellulose nanocomposites”, Australian Pulp and Paper Institute (Australia, Lecturer)
Yano H.: “Cellulose nanocomposites”, Queensland University of Technology (Australia, Lecturer)
Morooka T. “Humidity control effect of wood”, Beijing Forestry University (China, Lecturer)

**Student and research fellows from abroad**

Master’s program: 1 (Indonesia)

---

2.2.18 Laboratory of Sustainable Materials

*(Research Institute for Sustainable Humanosphere)*

**Staff**

Professor : Kawai, Shuichi, Dr. Agric. Sci.
Assistant Professor : Unemura, Kenji, Dr. Agric. Sci.

**Students and research fellows**

Doctor’s program: (1) Research fellow: (3)
Master’s program: (3) Researcher: (2)

**A. Research Activities (2007.4-2008.3)**

**A-1. Main subjects**

The laboratory aims to establish the sustainable cycle of forest and forest products by developing the production, utilization and recycling/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, and integrated projects in the interdisciplinary fields are being carried out to confirm the sustainability of production/utilization system of wood biomass.

The research projects are as follows:

1. Development of New Wood Based Materials
   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) Development of plant fiber reinforced composites by using plant fibers
   d) Development of bamboo carbon composites
   e) Rapid curing technology of cement bonded particleboard
   f) Development of ultra-low density fiberboard

2. Adhesive Resins/ Durability of Adhesion
   a) Durability of isocyanate resin adhesives
   b) Application of polysaccharides as adhesives
   c) Development of chitosan-based adhesives
d) Characterization of bonding mechanism of binderless board and its application to wood adhesives

e) Development and utilization of lignin binder

f) Production of high durable wood adhesives from bark of fast growing trees

3. Integrated Projects

a) Analysis of material cycle in large-scale industrial plantation
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

A-2. Publications and presentations

a) Publications

Original Papers


Patents


Reviews

Kawai S.: Development of environmenttaly adaptable materials from biomass resources. WEB Journal, No89, 34-36 (2007)


Reports


b) Conference and seminar papers presented

58th Annual Meetings of the Japan Wood Reserch Society: 8 presentations

G-COE International Workshop: 1 presentaion

The 16th Indonesian Scientific Conference in Japan: 1 presentaion

48th Annual Meeting of Atmospheric Environment: 1 presentaion

The 2007 IUFRO All Division 5 (Forest Products) Conference: 1 presentaion
A-3. Off-campus activities

**Membership in academic societies (roles)**
Kawai, S.: The Japan Wood Research Society (Member of directors board) The Society of Materials Science, Japan (General clerk, Members of the Committees of Wood Composite materials and Referee), The Japanese Forest Society, The Forest, Wood, and Environment Academy (Member of directors board, Member of Steering Committee), The Wood Technological Association of Japan (Member of directors board), The Japan Wood Preserving Association (Head of LCA Committee), The Adhesion Society of Japan, Umemura, K.: The Wood Technological Association of Japan (Planning Committee and Officer of the Kansai Branch, Officer of the Plywood Section), The Japan Wood Research Society (Member of Editorial Board).

**Membership in Science Council of Japan, etc.**
Kawai, S.: Associate Member of the Science Council of Japan

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

A-4. International cooperation and overseas activities

**International meetings (roles)**
Umemura, K.: AMEU Project Seminar, Indonesia (Invited participant)

**Membership in international academic societies**
Kawai, S.: International Academy of Wood Science (Fellow)
Umemura, K.: The Japan Wood Research Society (Member of Editorial Board).

**International joint researches, overseas research surveys**
Kawai, S.: Evaluation of wood biomass in large-scale platation forest and effective utilization of tropical fast growing trees (Indonesia and Malaysia)
Research and Development for Non-wood Lignocellulosic Materials (China)
Umemura, K.: Research survey of wood industry using fast-growing tree (China)

**Scholars from abroad**
Dr. Zhang Ming: Prof. of Nanjing Forestry University
Dr. Ragil Widyorini: Gadjah Mada University
Dr. Ma Lim Fei: Prof. of Zheng Jian Forestry College

B. Educational Activities (2007.4-2008.3)

**B-1. On-campus teaching**

a) Courses given
Undergraduate level: Wood Composites (Kawai, Yano), Science for Sustainable Humanosphere (Kawai)
Graduate Level: Seminar in Wood Composites (Kawai, Umemura).
Laboratory Course of Wood Composites (Kawai, Umemura).
Wood Composite Products I (Kawai)

134
B-2. Off-campus teaching, etc.

**Part-time lecturer**

Kawai S: Tokyo University of Agriculture and Technology (Faculty of Environment and Resource Science)

**Open seminar, etc**

Kawai, S.: 1st, 2nd, and 3rd NPO Sai-no-ki Symposia Symposium (Coordinator), Kaishonomori daigaku (Lecturer), Nagoya International Forum (Coordinator), Kyoto Biomass School (Lecturer), The Symposium for Promoting Domestic Forest Products Utilization (Lecturer), Forest Seminar in Okayama (Lecturer), Life Style Forum (Lecturer), Housing and Domestic Timber (Lecturer), Seminar of Kenaf Association (Lecturer), Hiyoshi Forest owners Association Seminar on the Award of Emperor (2008) (Coordinator), Seminar of Nantan Forest Association (Lecturer), Seminar of Japan Project Indurial Corp. (Lecturer),

Umemura, K.: Wood Science Seminar (Lecturer), School of wood adhesion (Lecturer),

B-3. Overseas teaching

**Lectures and seminars**

Kawai, S.: Science for Sustainable Humanosphere 2007 (Indonesia), Indonesia Grobal COE Program (Indonesia), USM-RISH Joint Symposium (Malaysia), The Humanosphere Science School 2008 (Indonesia)

**Students and research fellows from abroad**

Doctor course student: 1 person (Indonesia)

C. Other remarks

Kawai, S.: President of the association of the research institutes for Inter-universisty collaborations, Director of the Research Inst. for Sustainable Humanosphere, Member of education and research council, Kyoto Univ., Sub-committee member of JSPS Grant-in-Aid Committee, Councilor of Forst and Forest Products Lab. Japan, Councilor of Forest Management of Kyoto Prefecture, Adviser of Okayama Pref. Wood Technology Center, Sub-committee member of University Establishment (MEXT)
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.)  
Postdoctoral fellow : Kawasaki, Tamami  
Postdoctoral fellow : Nakayama, Tomoe  
Postdoctoral fellow : Fujita, Motoko  

Students and research fellows  
Doctor’s program : (4)  
Master’s program : (2)  
Research fellow : (3)  
Research fellow : (3)  
Foreign visiting scientist : (2)  
Foreign collaborative researcher : (3)  

A. Research Activities (2007.4-2008.3)  
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 foraging 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) Faunal and floral assessment of tropical plantation forests on wood-deteriorating agents
   Biodiversity assessment of wood-deteriorating organisms, such as termites and decay fungi, in tropical plantation forests to maintain sustainability.

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 anlysis of wood carbons and their application to electro-chemical devices
   Application of wood carbons to electro-chemical devices, such as litium-batteries and fuel cells, by detailed micro-structural analyses.

l) 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.

m) 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.: Dictionary of charcoal and wood&bamboo vinegars(edited by Yatagai, M.), Sojyu-Sha, Tokyo, 2007(in Japanese)

Original papers


Reviews

Reports
Imamura, Y.: Exploration and promotion of new interdisciplinary research projects on a sustainable humanosphere. RISH International Newsletter No.21: 1-2, 2007


b) Conference and seminar papers presented

The 23rd Annual Meeting of Japan Wood Preservation Association: 3 presentation
The 2007 Annual Meeting of Architectural Institute of Japan: 1 presentations
The 57th Annual Meeting of the Japan Wood Research Society: 13 presentations
The 58th Annual Meeting of the Japan Wood Research Society: 10 presentations
The 18th MRS Symposium: 1 presentation
The 34th Annual Meeting of Carbon Materials: 1 presentations
The 5th Annual Meeting of the Wood Carbonization Research Society: 2 presentation
The 5th Conference of Pacific Rim Termite Research Group: 3 presentations
The 37th Annual Conference of the International Research Group on Wood preservation: 4 presentations
The Joint Symposium of the 9th Eco-carbon and the 43rd Charcoal Utilization Research Groups: 1 presentation
The 55th Spring Meeting of the United Societies of Applied Physics: 1 presentation
The 56th Annual Meeting of the Japan Society for Material Sciences: 1 presentation
The Spring Meeting of E-MRS IUMRS ICEM 2007: 1 presentation
The 55th Annual Meeting of the Ecological Society of Japan: 1 presentation
The 2nd International Conference (CESEP'07), Carbon for Energy Storage and Environmental Protection: 1 piece
The International Carbon Conference 2007, CARBON 2007: 1 piece
The 2nd International Symposium on Sustainable Humanosphere 2007: 1 piece
IUFRO, All Division 5 Conference: 2 pieces
The Ecological Society of America 92nd Annual Meeting 2007: 1 piece
The International Research Group on Wood Protection: 1 piece

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 (President), Japanese Society of Environmental Entomology and Zoology (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
Hata, T.: Wood Carbonization Research Society (Member of the steering committee and technical and editorial 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 (B), Wood deterioration under the extreme environment (Head investigator), Grant-in-aid for Scientific Research (Exploratory), Development of the termite detector with a smell sensor (Head investigator), Grant-in-aid for Scientific Research (B), Development of new type of lithium battery from carbonized wood with multiwall carbon (Fellows), Grant-in-aid for Scientific Research (Exploratory), Development of carbonized-wood substrate for diffusing heat in solar power satellite (Fellows), Grant-in-aid for Scientific Research (B), Development of thermal conversion technology of wood biomass to carbon nano-tubes (Fellows), 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) Non-destructive survey of wooden cultural products with AE and radar technologies and inspection of treatments (Fellows), Grant-in-aid for Scientific Research (Exploratory), Development of wood-based space materials(Fellows)

Tsunoda, K.: Grant-in-aid for Scientific Research (B) Recoverable soil treatment units against termites based on grooming behavior (Head investigator), Grant-in-aid for Scientific Research (B), Wood deterioration under the extreme environment (Fellows)

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) Wood deterioration under the extreme environment (Fellows), Grant-in-aid for Scientific Research (Exploratory), Mechanical and material characteristics of termite mandibles (Fellows), Grant-in-aid for Scientific Research (Exploratory), Interaction between termites and white rot fungi and its applicability to termite control (Fellows), Grant-in-aid for Scientific Research (Exploratory), Development of the termite detector with a smell sensor (Fellows)

Hata, T.: Grant-in-aid for Scientific Research (B), Development of new type of lithium battery from carbonized wood with multiwall 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 Scientific Research (C) Utilization and Application of meso-porous carbons with crystal characteristic for electrodes (Fellows), Grant-in-aid for Scientific Research (B) Wood deterioration under the extreme environment (Fellows), Grant-in-aid for Scientific Research (Exploratory), Development of wood-based space materials(Fellows)
A-4. International cooperation and overseas activities

International meetings (roles)
Imamura, Y.: The Annual Meeting of the Chinese Society of Wood Science and Technology (Invited speaker)
Tsunoda, K.: The 5th Conference of Pacific-Rim Termite Research Group, Bali, Indonesia (President)
Yoshimura, T.: The 5th Conference of Pacific-Rim Termite Research Group, Bali, Indonesia (Secretary general)

Membership in international academic societies
Tsunoda, K.: Pacific Rim Termite Research Group (President), IUFRO Working Party 5.03.05 (Moderator)
Yoshimura, T.: Pacific Rim Termite Research Group (Secretary general)

International joint researches, overseas research surveys
Imamura, Y.: Joint research on deterioration of wood by outdoor exposure (Indonesia, Malaysia), Properties enhancement of wood by chemical modification (France), 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 the colony structure of Coptotermes formosanus (Australia), Joint research on the novel natural wood preservatives (Finland), Joint research on termite resistance of tropical timbers (Malaysia), Joint research on biodiversity of wood-deteriorating organisms in tropical plantation forests (Indonesia, Malaysia)
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)

Scholars from abroad
Collaborative researchers: 5 (Istanbul University·Turkey (2), Universiti Sains Malaysia·Malaysia, University of Georgia, USA, CSIRO Entomology ·Australia)

B. Educational Activities (2007.4-2008.3)
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: Lecture on Wood Deterioration Control II (Tsunoda), Seminar on Wood Deterioration Control (Imamura, Tsunoda, Yoshimura and Hata), Laboratory Course of Wood Deterioration Control (Imamura, Tsunoda, Yoshimura and Hata), Lecture in Kyoto University Sustainable Initiative (Imamura)
B-2. Off-campus teaching, etc.

**Part-time lecturer**

Imamura, Y.: Nara Educational University (undergraduate level), Kyusyu University (graduate level), Nagoya University (graduate level), Tokyo University of Agriculture and Technology (graduate level)

Yoshimura, T: The University of Tokyo (graduate level)

B-3. Overseas teaching

**Students and research fellows from abroad**

Foreign students: Doctor’s Program: 2 (Indonesia)
Postdoctoral fellow: 1 (Turkey)

C. Other remarks

Imamura, Y.: Kyoto University (Council member of Kyoto University Rakuyukai, Council member of Research Center for Ecology), ISO/TC Wood Preservation Committee (Member), 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), Architecture Research Association (Council member)

Yoshimura, T.: Japanese Agency for the Evaluation of Wood Preservatives (Member of technical committee), Toyama Prefecture (Invited researcher, Member of Research Promotion Council, Forestry Technology Center), Miyazaki Prefecture (Invited researcher, Wood Technology Center)

A. Research Activities (2007.4-2008.3)

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.
   The 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 in brittle manner, especially by 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
In order to propose a long duration and low environmental load wooden post & beam dwelling house to be built using Kyoto prefecture grown Sugi timber which are pre-dried by Hagarashi treatment then dried under about 40°C low temperature with moisture removing system so as to keep hart wood extractives having high anti-fungy or/and anti-termite function, we are developing heavy timber housing system which shall be composed of 15cm square timber with pith for continuous column, 12cm square timber with pith for short post and 12cmx 24cm rectangular timebr for beams, roof girder, and horizontal girders.

3. Estimation and Analyses of Mechanical Properties of Various Wooden Structural Components
a) Estimation of various wooden shear walls, floor system and semi-rigid frames.
We are estimating strength ratio (multiplier) of various shear walls and floor systems 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 are also developing optimum evaluation system for timber semi-rigid frame systems by cooperating with independent estimation organization.

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.
Compressing relatively low density Sugi timber up to 30 to 50% of the original volume can easily produce high-density joint supplemental material. 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).

d) Development of wooden blocks shear wall system
We are developing a new type of shear wall by using wooden block, which has grooves around each side face to interlock with other wooden blocks. Diamond shape Sugi compression wood keys were inserted into spaces, which were born by cutting off triangular area on each corner of the wooden blocks, to make in-plane stiffness of shear wall higher.

A-2. Publications and presentations
a) Publications

Books

Original papers
Z.W. Guan, A. Kitamori and K. Komatsu : Experimental study and finite element modelling of


Takeshi Shiratori, Kohei Komatsu, Adrian Leijten: Modified traditional Japanese timber joint system with retrofitting abilities, Structural Control and Health Monitoring, Published Online: Feb 8 2008 1:18PM, DOI: 10.1002/stc.240


Reports


Kohei Komatsu, Shinjiro Takino, Hajime Tateishi: “Lag Screwed Timber Joints with Timber Side
Members”, Proceedings of the 40th Meeting of CIB-W18, Paper No.40·7–8, Bled, Slovenia, August 2007.


Kohei Komatsu, Mitsushi Akagi, Chiori Kawai, Takuro Mori, Kiyoshi Hosokawa, Shingo Hattori: Comparisons of Performances of Beam-Column Joints in the case of that composed of Through-Bolts and that composed of LSB for Column-side Joint, Proceedings of the 98th Symposium on Sustainable Humanosphere, 1·10, Kyoto, 2007. (in Japanese)


Hiroshi Watanabe, Sakuma, Kohei Komatsu, Takuro Mori: Cyclic Loading Test of Sugi Glulam


b) Conference and seminar papers presented

The 2007 Annual Meeting of the Japan Wood Research Society (8-10, August, 2007): 10 papers
The 2007 Annual Meeting of Wood Technological Association of Japan (26-28, September, 2007) 1 paper
The 2008 Annual Meeting of the Japan Wood Research Society (17-18, March, 2008): 7 papers
A-3. Off-campus activities

Membership in academic societies (roles)
Kohei Komatsu: Architectural Institute of Japan (Committee Member of Timber Structure, Chief of Sub-Committee for Design of Timber Joints), The Society of Materials Science (Reviewer), The Japan Wood Research Society (Award Winner Selection Committee Member), Japan Timber Engineering Society (Board member)
Shinjiro Takino: The Japan Wood Research Society, Architectural Institute of Japan
Takuro Mori: Architectural Institute of Japan (Secretary in Kansai branch), The Society of Materials Science Japan (Committee Member in Wood Based Materials), The Japan Wood Research Society, Wood Technological Association of Japan, Japan Timber Engineering Society

Research grants
Kohei Komatsu (Chief), Shinjiro Takino & Takuro Mori (Sub): Research Grant of Japan Society for the Promotion of Science (B2), Development New Innovative Wooden Post & Beam Structures Taken Material’s Characteristics As Much As Possible and Analysis of It’s Strength Expression Mechanism
Kohei Komatsu (Chief), Shinjiro Takino & Takuro Mori (Sub): Development of Low Environment Load and Resource Sustainable Wooden Dwelling Houses Made of Natural Materials Typical to Kyoto, Research Grant for Developing Construction Technique, Ministry of Land, Infrastructure, Transport and Tourism
Kohei Komatsu and Takuro Mori (Sub): Research Grant of Japan Society for the Promotion of Science (S), Research on Development of Seismic Design Method of Traditional Wooden Structures Based on their Structural Details.
Takuro Mori (Chief): TOSTEM Foundation for Construction Materials Industry Promotion, Research Grant, Investigate the damage of the beam material for termite.
Takuro Mori: Saneyoshi Foundation, Research Grant for Oversea Travel, Board Shear Wall

A-4. International cooperation and overseas activities

International meetings (roles)
Takuro Mori: ICBS, 28-30th October 2007, Changsha, China, (Presenter and session chairman)

International joint researches, overseas research surveys
Kohei Komatsu, Shinjiro Takino and Takuro Mori: (1st April to 30th June 2007) Cooperative research with Professor Y.H. Chui, Director of Wood Science and Technology Research Center of New Brunswick University, Canada, on “Improvement of I-beam performance” while he was an invited professor of RISH(10th Jan. to 30th June 2007)

B. Educational Activities (2007.4-2008.3)
B-1. On-campus teaching
a) Courses given
Undergraduate level: Science for Sustainable Humanosphere - Development of Technology and Materials for Cyclical Utilization of Bio-based Resources (Komatsu)
Graduate Level: Wooden Structural Function II (Komatsu), Lecture for Kyoto Sustainable Initiative Course (Komatsu)
Seminar in Structural Functions (Komatsu, Takino, Mori).
Laboratory Course of Structural Functions (Komatsu, Takino, Mori)

B-2. Off-campus teaching, etc.

Part-time lecturer
Undergraduate level: Architecture and Society (Cyuubu University, Komatsu)
Graduate level: Glulam Structures (Cyuubu University, Komatsu)
Lecturer: Timber structures (Kagoshima Industrial Research Center, Komatsu)

Open Lectures
Kohei Komatsu: Kyoto University Open Campus (Lecture), RISH 98th Symposium (Lecture), RISH 72nd Symposium (Lecture)
Takuro Mori: RISH 98th Symposium (Lecture)

B-3. Overseas teaching

Overseas Lectures and Open Lectures
Kohei Komatsu: Special lecture at timber structure course in Nanjing Forestry University, 11th to 14th November 2007 (Nanjing Forestry University, Nanjing, China)
Kohei Komatsu: Keynote Speaker: Indonesian National Seminar on System of Preparing Quality Timber for Construction, 26th November 2007 (RIHS, Bandung, Indonesia)

Students and research fellows from abroad
RISH Invited Professor: 1 (Canada)
Foreign cooperative researcher 0

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, Committee Member for JSPS, 10th WCTE Advisory Committee Member, Visiting Research Fellow in Kagoshima Industrial Research Center
Takuro Mori: WG member of Kansai-branch on Architectural Institute of Japan, Higashi-Honganji-Temple Project Member, Secretary of Wood and Wood-Based Materials Committee on the Society of Materials Science Japan.