### Scientific Programme for the 5th Pacific Rim Bio-based Composites Symposium

#### Sunday 10th December 2000

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<td>9.00am - 5.00pm</td>
<td>Workshop on Wood-Cement Composites</td>
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<td>Workshop on Chemical Modification of Lignocellulosics</td>
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#### Monday 11th December 2000

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<td>Opening and Keynote Papers</td>
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<td>Adhesives for Composites (2)</td>
<td>11.30am - 12.30pm</td>
<td>Modelling of Wood Composites (1)</td>
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<td>Medium Density Fibreboard</td>
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<td>Characterisation and Testing of Wood Composites</td>
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#### Tuesday 12th December 2000

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<td>Veneer, Plywood and Laminates</td>
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<td>Thermal Modification of Composites</td>
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<td>Particleboard</td>
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<td>Composites from Agricultural Waste</td>
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<td>11.00am - 12.30pm</td>
<td>Novel Technology for Orientated Wood Composites</td>
<td>1.30pm - 3.00pm</td>
<td>Composites from Recycled Wastes (1)</td>
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<td>1.30pm – 3.00pm</td>
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<td>9.00am – 10.30am</td>
<td>Wood-Plastic Composites (1)</td>
<td>9.00am – 10.30am</td>
<td>Fire Resistance of Composites</td>
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<td>11.00am – 12.30am</td>
<td>Wood-Plastic Composites (2)</td>
<td>11.00am - 12.30pm</td>
<td>Deterioration and Preservation of Composites</td>
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#### Poster Session

Nyanza/Geneva Rooms

5.30pm - 6.00pm

#### Plenary Session

Superior Room

1.30pm – 3.30pm | Australian Research on Bio-based Composites

### Prizes, Presentations and Closure
Sunday 10th December 2000, 9.00am - 5.00pm, Michigan Room: Workshop on Wood-Cement Composites

9.00 - 9.15am Opening of Workshop by Dr Ian Bevege, Australian Centre for International Agricultural Research

9.15am - 10.30am Session Chair: Elvira Fernandez

Hydration Reactions of Cement and Wood-Cement Compatiblity

Manufacture of Cement-Bonded Boards from Wood and Other Lignocellulosic Materials and Relationships Between Cement Hydration and Mechanical Properties of Cement-Bonded Boards

Ling Fei Ma1, Hidefumi Yamauchi1, Orlando R. Pulido1, Yasuo Tamura1, Hikaru Sasaki1 and Shuichi Kawai1

1Institute of Wood Technology, Akita Prefectural University, 11-1 Kaieizaka Noshiro, Akita 016-0876, JAPAN. 2Wood Research Institute, Kyoto University, Kyoto, JAPAN

Effect of Extractives on the Properties of Cement-Bonded Board from Teak (Tectona grandis)

Purbroto Satiguno

Forest Products Research and Development Centre, Bogor, INDONESIA

Screening Inorganic Additives to Ameliorate the Inhibition of Hydration of Portland Cement by the Heartwood of Acacia mangium

Kate E. Sample, Philip D. Evans

Department of Forestry, The Australian National University, Canberra, AUSTRALIA

11.00am - 12.30pm Session Chair: Rico Cabangon

Cement-Bonded Composites from Wood and Agricultural Residues

Cement-Bonded Boards from Wastewater Treatment Sludge of a Recycled Paper Mill

Elvira Fernandez, Clevan Reyve Lamason and Teodulfo Delgado

Department of Forest Products and Paper Science, College of Forestry and Natural Resources, University of the Philippines Los Baños College, Laguna 4031, PHILIPPINES

Resistance of Wood- and Bamboo Cement- Boards to Subterranean Termite Coptotermes Gestroi Wasmann (Isopteran:Rhinotermitidae)

P. Sukartana, R. Rushelia, and I.M. Sulastiningsih

Forest Products Research Centre (FPRC) Bogor, INDONESIA

The Effect of Bamboo-Cement Ratio and Magnesium Chloride (MgCl2) Content on the Properties of Bamboo-Cement Boards

I.M Sulastiningsih1, Nurwati1, S. Murdjoko2, and S. Kawai3

1Forest Products Research Centre, Bogor, Indonesia. 2Alumnus Faculty of Forestry, Winaya Mukti University, Bandung, Indonesia. 3Wood Research Institute, Kyoto University, Uji Kyoto 611, JAPAN

The Utilization of Processing of Rice Straw in the Manufacture of Cement-Bonded Fiberboard

Elvira Fernandez and Vanessa Taja-on

Department of Forest Products and Paper Science, College of Forestry and Natural Resources, University of the Philippines Los Baños College, Laguna 4031, PHILIPPINES

1.30pm – 3.00pm Session Chair: Florence Soriano

Cement-Bonded Composites from Eucalypts and Acacias

Effect of Post Harvest Storage on the Suitability of Acacia mangium for the Manufacture of Wood Wool Cement Boards

Rico Cabangon1, Dwight A. Eusebio2, Florence P. Soriano3, Ross B. Cunningham4 and Philip D. Evans5

1Forest Products Research and Development Institute, College, Laguna 4031, PHILIPPINES. 2Department of Forestry, The Australian National University, Canberra ACT 2000, AUSTRALIA

Manufacture of Low-Cost Wood-Cement Composites in the Philippines using Plantation Grown Australian Species I. Eucalypts & II. Acacias

Dwight Eusebio1, Rico Cabangon2, Florence Soriano1 and Phil Evans2

1Forest Products Research and Development Institute, College, Laguna, PHILIPPINES. 2Department of Forestry, The Australian National University, Canberra, AUSTRALIA

Fibre-cements from Brazilian Waste Materials

Peter Warden, H. Savastano, Robert S. P. Couotts

CSIRO Forestry and Forest Products, Private Bag 10, Clayton South MDC, Victoria 3169, AUSTRALIA

Compatibility of Eight Temperate Australian Eucalyptus Species with Portland Cement

Kate E. Sample1, Ross B. Cunningham1, Philip D. Evans1

1Department of Forestry, The Australian National University, AUSTRALIA

3.30pm – 5.00pm Session Chair: Dwight Eusebio

Novel Cement-Bonded Wood Composites and Applications

Application of Wood Wool Cement Boards for Shop-Fabricated Emergency Shelters in the Philippines

Florence Soriano, R.T.E. Rondero, C.R. Carino, T.C. Saralde Jr, A.C. Manalo and E.A. Bonaagaa

Structural Design and Engineering Section, Materials Properties Evaluation Division, Forest Products Research and Development Institute, College, Laguna, PHILIPPINES

Production and Properties of Oriented Cement-Bonded Boards From Sugi (Cryptomeria japonica D. Don)

Ling Fei Ma1, Hidefumi Yamauchi1, Orlando Pulido1, Hikaru Sasaki1 and Shuichi Kawai2

1Institute of Wood Technology, Akita Prefectural University, 11-1 Kaieizaka Noshiro, Akita 016-0876, JAPAN. 2Wood Research Institute, Kyoto University, Kyoto, JAPAN

Study on the Hydration Properties of Wastepaper Fiber-Cement Board by Carbon Dioxide Injection Pressing Process

Hweig Wang1, Hwa-Wen Yin2 and Che-Tsung Tsou3

1Department of Forestry, National Taiwan University, Taipei, Taiwan, R.O.C. 2Division of Forest Chemistry, Taiwan Forestry Research Institute, Taipei, TAIWAN, R.O.C.

Manufacturing of Wood Strand-Cement Composite for Structural Use

Atsushi Miyatake, Tatsushi Fujii, Yasushi Hiramatsu, Hisashi Abe and Mario Tonosaki

Forestry and Forest Products Research Institute, Tsukuba, JAPAN

1.50pm – 2.30pm Session Chair: Florence Soriano

Cement-Bonded Composites from Vascular Plants

Elvira Fernandez and Rico Cabangon

Department of Forest Products and Paper Science, College of Forestry and Natural Resources, University of the Philippines Los Baños College, Laguna 4031, PHILIPPINES

Manufacturing of Wood Wool-Cement Composites from Rice Straw

Dwight A. Eusebio, Florence P. Soriano and Ross B. Cunningham

Forest Products Research and Development Institute, College, Laguna, PHILIPPINES

Study on the Hydration Properties of Rice Straw Fiber-Cement Board

Hweig Wang1, Hwa-Wen Yin2 and Che-Tsung Tsou3

1Department of Forestry, National Taiwan University, Taipei, Taiwan, R.O.C. 2Division of Forest Chemistry, Taiwan Forestry Research Institute, Taipei, TAIWAN, R.O.C.

Manufacturing of Wood Strand-Cement Composite for Structural Use

Atsushi Miyatake, Tatsushi Fujii, Yasushi Hiramatsu, Hisashi Abe and Mario Tonosaki

Forestry and Forest Products Research Institute, Tsukuba, JAPAN
Sunday 10th December 2000, 9.00am - 5.00pm, Superior Room: Workshop on Chemical Modification of Lignocellulosics

9.00 - 9.15am Opening of Workshop by Professor Roger Rowell, United States Department of Agriculture

New Chemistries and Properties of Modified Wood (1)
9.15am – 10.30am Session Chair: Rebecca Ibach

Propionylation of Wood at Low Temperature Using Sodium Formate Catalyst
Takeshi Furuno, Jian-Zhang Li and Sadanobu Katoh
Faculty of Science and Engineering, Shimane University, Matsue City, JAPAN

Polyurethane Films made from Liquefied Woods of Different Species
Y. Kurimoto, A. Koizumi, S. Doi and Y. Tamura
Institute of Wood Technology, Akita Prefectural University, 11-1 Kaeizaka, Noshiro City, 016-0876, JAPAN

Dimensional Stability and Flame Resistance of Barium Hydrogenphosphate-Acetylated and -Propionylated Wood
Jian-Zhang Li, Takeshi Furuno, and Sadanobu Katoh
Faculty of Science and Engineering, Shimane University, Matsue City, JAPAN

New Chemistries and Properties of Modified Wood (2)
11.00am – 12.30pm Session Chair: Barbara Stefke

Photostabilisation of Woodfibre-Plastic Composites by Chemical Modification of Woodfibre
M. Kiguchi1, Y. Kataoka1, H. Kaneiwa2, K. Akita2 and P.D. Evans3
1Forestry & Forest Products Research Institute, PO Box 16, Tsukuba Norin Kenkyu, Ibaraki, 305-8687, JAPAN
2Fukuvi Chemical Industry Co. Ltd., Fukui, JAPAN
3Department of Forestry, The Australian National University, Canberra, AUSTRALIA

Resistance of Furfuryl Alcohol Modified Scots Pine Towards Termite Attack
Yusuf Hadi1, M. Westin2, M. Yusuf3 and E. Rasyid3
1Faculty of Forestry, Bogor Agricultural University, P.O. Box 168 Bogor, INDONESIA
2Chalmers University of Technology, Goteborg, SWEDEN
3Winaya Mukti University, Bandung, INDONESIA

High Strength Wood Based Materials
Hiroyuki Yano
Wood Research Institute, Kyoto University, JAPAN

Properties of Modified Wood (1)
1.30pm – 3.00pm Session Chair: Yusuf Hadi

Modified Spruce Wood: Multidisciplinary Approach from Raw Material to the Needs of the End User
Barbara Stefke1, Martin Bruderhofer2, Milojka Gindl3, Karl Hegl1, Margareta Patzel1, Alexander Reiterer2, Peter Schwarzbaier1, Gerhard Stinn1, Robert Stingl3 and Barbara Hinterstoisser1
University of Agricultural Sciences (BOKU), Muthgasse 18, A-1190 Wien, AUSTRIA
1Institute of Chemistry, 2Institute of Physics, 3Institute of Forest Sector Policy and Economics, 4Institute of Wood Research

Photoprotection of Chemically Modified Wood. Weathering of Benzoylated Scots Pine
Philip D. Evans1 and Noel Owen2
1Department of Forestry, The Australian National University, Canberra, AUSTRALIA
2Department of Chemistry & Biochemistry, Brigham Young University, Provo, Utah, USA.

Chemical Modification of Wood to Improve Decay and Thermal Resistance
Hong-lin Lee1, George C. Cheng2, and Roger M. Rowell2
1Taiwan Forestry Research Institute, Taipei, TAIWAN
2USDA, Forest Service, Forest Products Laboratory, Madison, USA

Properties of Modified Wood (2)
3.30pm – 5.00pm Session Chair: Makoto Kiguchi

A New Process for the Continuous Acetylation of Lignocellulosic Fiber
Rune Simonson and Roger M. Rowell
Chalmers University of Technology, Department of Forest Products and Chemical Engineering, Gothenburg, SWEDEN

Decay Protection Based on Moisture Exclusion resulting from Chemical Modification of Wood
Rebecca E. Ibach, Roger M. Rowell and Beom-Goo Lee
USDA, Forest Service, Forest Products Laboratory, Madison, USA
Monday 11th December 2000, 9.00am - 11.00am, Michigan Room: Main Session

9.00 - 9.10am Opening of the Symposium

followed by

Keynote Papers Session Chair: Shuichi Kawai

Urea-Formaldehyde (UF) Glue Resins: an Adhesive Ever Young

Manfred Dunky

Krems Chemie / Neste Resins, A-3500 Krems, Hafenstrasse 77, AUSTRIA

Technology for the Production of Cylindrical LVL

Hikaru Sasaki1, Hidefumi Yamauchi1, Ling Fei Ma1, Orlando R. Pulido1, Mitsuteru Kataya1 and Shuichi Kawai2

1Institute of Wood Technology, Akita Prefectural University, 11-1 Kaieizaka Noshiro, Akita 016-0876, JAPAN
2Division of Wood Material Science, Wood Research Institute, Kyoto University, Uji, Kyoto, 611-0011, JAPAN

Modelling Vertical Density Profile in Wood Composites During Hot Pressing

Chunping Dai, Changming Yu and Pascal Hubert

Forintek Canada Corp., Vancouver, B.C., CANADA

Sealed Consolidation of Oriented Natural Fiber Composite Pre-forms with Sequential Reactant Injection and Removal

Philip E. Humphrey* and M.J.A. Chowdhury**

*Professor of Forest Products and Materials Science, **Graduate Research Assistant, Oregon State University, Corvallis, Oregon, USA
Monday 11th December 2000, 11.30am - 5.30pm: Concurrent Sessions

Session 1 – Michigan Room

Adhesives for Composites: 11.30am - 12.30pm, Chair: Charles Frazier

Resin Distribution in Medium Density Fibreboard: Quantification of UF Resin Distribution on Blowline Blended MDF Fibre and Panels
Cent Loston1*, Armin Thumm1*, Warren Grigsby1, Tracy Adams2 and Rick Ede1
1Forest Research, Rottna, New Zealand 2BioComposite Centre, University College of North Wales, Bangor, Gwynedd LL572UW Wales, UK
Factors Affecting Formaldehyde Release in Medium Density Fibreboard, Selecting E0 Resin Systems
Patrick Auhus
Dynea NZ Ltd, 149 Corbett Road, Bell Block, New Plymouth, NEW ZEALAND

Adhesives from Biomass: 1.30pm - 3.00pm, Chair: Manfred Dunky

The Effects of Biomass Extraction on Gluability of Biomass Copolymer Resins for Bonding Japanese Cedar (Cryptomeria japonica D. Don) Veneer
Chia-Ming Chen and Linda C.-Y. Hu1
1School of Forest Resources, University of Georgia, Athens, GA 30602, USA 2Department of Forestry, National Chung Huang University, Taichung, TAIWAN

Gluing Wood Veneers of Blackbutt Using Phenol-Formaldehyde (PF) Adhesives
P.L. Collins, S.D. Trett1 and Y. Yazaki
CSIRO Forestry and Forest Products, Private Bag 10, Clayton South, 3169 AUSTRALIA

Tannins for OSB? 1Kai Krag and Jorg Hasener
Federal Research Centre for Forestry and Forest Products, Institute for Wood Physics and Mechanical Wood Technology, GERMANY

Adsorption of Formaldehyde on Sugi Bark Composites
Yoshinori Kikuchi, Heng Xu and Yasuo Tamura
Institute of Wood Technology, Akita Prefectural University, 11-1 Kaezaki, Noshiro, Akita 016-0876, JAPAN

Medium Density Fibreboard: 3.30pm - 5.30pm, Chair: Jamie Hague

Chemical Characterization of Constituents from Radiata Pine Presteamer Screw Press Effluent in an MDF Operation
Alicia G. McDonald and Andrew B. Clare
Material Discovery Group, Forest Research, Private Bag 3029, Rotora, NEW ZEALAND

Effects of Zinc Borate on the Properties of Medium-Density Fibreboard
Kuni Tsumura1, Hiroshi Watanabe1, Katsumi Fukuda1 and Katashiko Haga1
1Wood Research Institute, Kyoto University, Uji, Kyoto, 611, Japan. 2Tokubeka Research Institute, Sumimoto Forestry Co., Ltd., Shinnaka Green Tower Building, 14-1, Nishi-Shinnaka 6-chome, Shinnaka, Toky o 160, JAPAN

MDF From Palm Oil By-Products
Volker Thiel
Frankhorder Gesellschaft, Wilmhelm-Klauditz-Institut für Holzforschung, Braunschweig, GERMANY

Manufacture of MDF From 5-Year old Hevea brasiliensis
Er Dong Wang1 and A.K. Razali2 and Siti Norulakman Yahya1
1 Faculty of Forestry, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, MALAYSIA. 2Glowood Hope Plantations Berhad, P.O.Box 207, 42700 Bangi, Selangor, MALAYSIA. 3Glowood Hope Fibreboard Sdn, BHD, P.O. Box 10, 71407 Nilai, Negeri Sembilan, MALAYSIA

Effects of Formaldehyde Emissions from Plywood and MDF on Mould Growths
Shaicha Da1, Yasuo Tamura1, Xia Yong1 and Nobuteru Kuwako1
1Institute of Wood Technology, Akita Prefectural University, Akita 016-0876, JAPAN. 2Koyo Sango Co. Ltd., Tokyo 101-0044, JAPAN

Session 2 – Superior Room

Modelling of wood composites (1): 11.30am - 12.30pm, Chair: Fred Kamke

Characterisation of the Viscoelastic Behaviour of Medium Density Fibreboard Using Taguchi Analysis
J. van Houwi, K. Jayaraman and Debesh Bhattacharyya
Centre for Composite Research, School of Engineering, University of Auckland, Auckland, NEW ZEALAND

Shear Wall with Self-Restoring Ability - Computer Simulation of Its Structural Behaviour Under Cyclic Loading
Pang Young1, Yasuo Ohsako1, Hikaru Sasaki2, Tamotsu Suzuki2 and Taijirou Nomaka3
1Faculty of Education, Kamamoto University, Kamamoto 805-8555, JAPAN. 2Institute of Wood Technology, Akita Prefectural University, Noshiro 016-0876, JAPAN. 3Prevention Research Institute, Kyoto University, Kyoto 611-0011, JAPAN

Modelling of wood composites (2): 1.30pm - 3.00pm, Chair: Rick Ede

Viscoelastic Thermal Compression of Wood
Fred Kamke1, E.V. Kallikova2, and Chris Lenth2
1Wood-Based Composites Center, Dept. of Wood Science and Forest Products, Virginia Tech, Blacksburg, Virginia, USA. 2Forest Research, Rotorua, NEW ZEALAND

The Continuous Pressing of wood-based Panels: An Analytical Simulation Model, its Validation and Use
Philip E. Humphrey1 and Heiko Thiemen2
1Oregon State University (OSU), Corvallis, Oregon, USA. 2Formerly OSU, currentlyUniversita Humbatt, GERMANY

Study on Compressive Moulding Wood by Stream Treating at High Temperature
Liu Yingang, Li Jian, Wang Xiantian, Liu Zhisheng, Men Jun and Zhan Zhiqiangheng
College of Forest Products, Northeast Forestry University, No. 26 Hexing Road, PO Box 307, Harbin 150504, PR CHINA

Characterisation & Testing of Wood Composites: 3.30pm - 5.30pm, Chair: Debesh Bhattacharyya

Fracture Cleaveage testing of Adhesively-Bonded Wood
Charles E. Frazier, M.P. Labore, and J.M. Guttian
Virginia Polytechnic Institute & State University, Blacksburg, Virginia, USA

Creep of ISO- and PF-Bonded Particleboards Under Hot and Humid Conditions
Ron Page, Peter M. Yeh1 and E.W. Price2
1Professor, School of Forestry & Wildlife Sciences, Auburn University, Alabama, USA
2Professor, Department of Forest Products Industries, National Pingtung University of Science & Technology, TAIWAN, R.O.C.

Material Behaviour of Pinus radiata in Severe Environments: Background, Methodology and Specialised Equipment
C.A. Lenth, S. Pang and A.N. Haslett
New Zealand Forest Research Inst. Ltd., Rotorua, NEW ZEALAND

Collapse Index of Beaten Fibres by Confocal Microscopy
C.A. Lenth, K. Jayaraman and Debes Bhattacharyya
Wood-Based Composites Center, Dept. of Wood Science and Forest Products, Virginia Tech, Blacksburg, Virginia, USA.

On Several Properties of some Modified Wood-Based Composites
Petar Todorovic1, N. Atanackov2, V. Knezic1, M. Norimoto3, J. van Houwi1, K. Jayaraman and Debes Bhattacharyya
1Faculty of Forestry, Kneza Viseslava 1, 11030 Belgrade, Serbia/Yugoslavia
2Faculty of Forestry, Kneza Viseslava 1, 11030 Belgrade, Serbia/Yugoslavia
3Faculty of Education, Kumamoto University, Kumamoto 860-8555, JAPAN.

Moisture Movement Caused by Internal Pressure in Wood During Hybrid Drying Using HF and Hot-Air
Y. Kawai, Y. Kibayashi and M. Norimoto
1Institute of Wood Technology, Akita Prefectural University, 11-1 Kaezaki, Noshiro, Akita 016-0876, JAPAN
2Forest Research, Rotorua, NEW ZEALAND

Moisture Movement Caused by Internal Pressure in Wood During Hybrid Drying Using HF and Hot-Air
Y. Kawai, Y. Kibayashi and M. Norimoto
1Institute of Wood Technology, Akita Prefectural University, 11-1 Kaezaki, Noshiro, Akita 016-0876, JAPAN
2Forest Research, Rotorua, NEW ZEALAND
Tuesday 12th December 2000, 9.00am - 12.30pm: Concurrent Sessions

Session 1 – Michigan Room

Veneer, Plywood and Laminates: 9.00am - 10.30pm, Chair: Chunping Dai

Structural Application of the Cylindrical LVL
Hidefumi Yamauchi, Hikaru Sasaki, Ling Fei Ma and Orlando R. Pulido
Institute of Wood Technology, Akita Prefectural University, 11-1 Kairizaka Noshiro, Akita 016-8576, JAPAN

Prevention Against Surface Checks of the Boxed-Heart Square Timbers of Japanese Cedar by Laminating Dried Thin Laminae
Noboru Fujimoto
Assistant Professor, Faculty of Agriculture, Kyushu University, Fukuoka 812-8581, JAPAN

Shear Property of Sandwich Panel of Plywood-Overlaid Fiberboard
Takamichi Kusaka, Hwang kweon Hwan, Kohei Komatsu, Shuichi Kawai
Wood Research Institute, Kyoto University, JAPAN

Maintenance of Timber Structures (including joint areas) in Japan
Yutaka Iimura
Former Deputy General Manager, Timber Engineering Division, Mitsui Wood Systems Inc., Tokyo, JAPAN

Particleboard: 11.00pm - 12.30pm, Chair: Dwight Eusebio

Effect of Particle Geometry on Dimensional Stability and Mechanical Properties of Particleboard
Keita Misamoto and Shigeruko Shintani
Shizuoka University, Ohya-836, Shizuoka-shi, 422-8529, JAPAN

Dimensional Stabilities and Mechanical Properties of Three-Layered Particleboards with Steam Pretreated Face Strands
Noboru Sekino1, Masafumi Inoue2 and Hidefumi Yamauchi3
1Facility of Agriculture, Iwate University, JAPAN.
2Division of Wood Material Science, Wood Research Institute, Kyoto University, Uji, Kyoto, 611-0011, JAPAN
3Institute of Wood Technology, Akita Prefectural University, JAPAN

Characteristic of Ultrasonic Wave Transmission in Particleboard
Han Chien Lin1, Yoshiyuki Fujimoto2 and Yasuhide Murase2
1Graduate School of Bioresource and Bioenvironmental Sciences, Kyushu University, JAPAN.
2Faculty of Agriculture, Kyushu University Graduate School, Fukuoka 821-8581, JAPAN

Session 2 – Superior Room

Thermal Modification of Composites: 9.00am - 10.30pm, Chair: Shuichi Kawai

Steam Stabilization of Aspen Fiberboards
Roger Rowell, Sandro Lange and Mark Davis
USDA, Forest Service, Forest Products Laboratory, Madison, USA

Thermo-Hydro-Mechanical Post-Treatments of Densified Wood
Paavo Nau1, Fred Girardet2 and Frédéric Heger3
1Swiss Federal Institute of Technology - Lausanne, Department of Material Science and Engineering, MX-G 1015 Lausanne, SWITZERLAND
2Expert-Center - Lausanne for Conservation of Cultural Heritage, MX-G 1015 Lausanne, SWITZERLAND
3Faculty of Agriculture, Gifu University, 1-1 Yanagido, Gifu 501-1193, JAPAN

Adhesive-Free Biomass Boards Fabricated by the High-Pressure Steam Process
Saw Onwono-Agyeman1, Mitsuhiko Tanahashi1, Mikiji Shigematsu1, Shiro Sugi1 and Hajime Itoh2
1Faculty of Agriculture, Gifu University, 1-1 Yanagido, Gifu 501-1193, JAPAN.
2Gifu Prefectural Livestock Research Institute, Swine Research Department, Gifu, JAPAN

Assembled-Wood Production From Small Logs Without Adhesives by the Compressive Moulding Process
Mitsuhiko Tanahashi, Ken-ichi Kyomori, Yumi Natsume, Shingo Okawa, Mikiji Shigematsu and Saw Onwono-Agyeman
Department of Bioprocessing, Faculty of Agriculture, Gifu University, 1-1 Yanagido, Gifu 501-1193, JAPAN

Composites from Agricultural Waste: 11.00pm - 12.30pm, Chair: Yusuf Hadi

Fibrous Crop Raw Materials as a Source of Textiles and Composites
Ryszard Kozlowski and S Manys
Institute of Natural Fibres, 71b Wojska Polskiego St, 60-630 Poznan, POLAND

Preliminary Studies on Preparation of Dissolving Pulp from Oil Palm Empty Fruit Bunches
Kyohi Tanaka1,2 and Wan Rodzi Wan Dan1
1Forestry Division, Japan International Research Center for Agricultural Sciences (JIRCAS), 1-2 Ohwashi, Tsukuba, Ibaraki 305-8686, JAPAN
2Wood, Paper and Coatings Division, School of industrial technology, Universiti sains Malaysia, 11800 Penang, MALAYSIA

Modified Formaldehyde-based Resin Adhesives for Rice Husk/Wood Particleboard
Chua van Hau1 and Elvira T. Cheong2
1Principle Wood Scientist, Southern Research Station, USDA Forest Service, Pineville, LA 71360, USA
2Professor, School of Forestry, Wildlife and Fisheries, Louisiana State University, Baton Rouge, LA 70808, USA

Rice Hulls, A Unique Building Material
P W Klett and S B Spiers
Regentours Co-operative Ltd, Yanco Avenue, Lenton, NSW, AUSTRALIA
**Tuesday 12th December 2000, 1.30pm - 5.30pm: Concurrent Sessions**

**Session 1 – Michigan Room**

**Novel Technology for Oriented Wood Composites: 1.30pm - 3.00pm, Chair: Laurent Matuana**

**Evaluation of Fiber Alignment and its Effects on the Properties of Low-Density Fiberboard**
Shuichi Kawai, N. Ishida, S. Inoue, K. Tadano, T. Ohya, and T. Kawasaki
Department of Wood Science, Akita Prefectural University, Japan

**Reduction in Thickness Swelling of OSB**
Orlando R. Pulido, H. Ma-matchi, and M. Y. K. Ong
Department of Forestry, National Taiwan University, Taipei, TAIWAN, R.O.C.

**Oriented Strand Board as a Means of Improving the Flexural Properties of Wood-Wool Cement Boards in the Philippines**
Rico Ceballos and Philip D. Evans
Department of Forestry, The Australian National University, Canberra, ACT 0200 AUSTRALIA

**Properties of Oriented Composite Boards From Wood Manufactured by the Electrostatic and Mechanical Orientation Methods**
Shigehiko Suzuki and Rico Cabangon
Division of Wood Material Science, Wood Research Institute, Kyoto University, Kyoto JAPAN

**Manual Strand Orientation as a Means of Improving the Flexural Properties of Low-Density Fiberboard**
George Freischmidt
Faculty of Forestry, University Putra, MALAYSIA

**Orientation Methods**
Chunping Dai
CSIRO Forestry and Forest Products, Private Bag 10, Clayton South MDC, Victoria, 3169, AUSTRALIA

**The Characteristics of OSB Made from Flakes Impregnated With PF Resin**
Matthew Warzinski, R. E. Gonzalez, and M. A. Said
Forintek Canada Corp., Vancouver, BC, CANADA

**Blending of Eucalypt and Softwood Flakes in Oriented Strandboard.**
Sangho Kim and Hyo Hatakeyama
Department of Forestry, National Taiwan University, Taipei, TAIWAN, R.O.C.

**Research and Development in Oriented Strand Board (OSB) Processing**
Kumiai Corp., 2nd plant, Japan

**Recycled Wood as a Raw Material for Current PB Production and a Potential Use for J-OSB**
Masanori Funabashi
Faculty of Agriculture, Tottori University, Koyama, Tottori 680-0945, JAPAN

**Composites from Recycled Wastes (1): 1.30pm - 3.00pm, Chair: David Robson**

**Post-Consumer Wood Waste as Raw Material for Particleboard and MDF**
Stefan Wolf
Technology Department, Wood Division, G. Sempelkamp GmbH & Co. Maschinen- und Anlagenbau, GERMANY

**Manufacturing of Particleboard using Parts Made from Demolition Lumber**
Yoshiyuki Fujimoto, H. Inami, and R. Takahashi
Kureha Chemical Industry Co., Ltd., Yokohama, JAPAN

**Natural Bast Fibres and Recycled Fibres in Composites for Automotive Industry**
Byoung Koo Kim
Korea Institute of Science and Technology, Seoul, KOREA

**Thermal and Mechanical Properties of Polyurethane Composites Containing Residue From Palm Oil Production**
Masahiro Tsuchiuchi, Shigeo Hirose, Tatsuko Hatakeyama, and Hyo Hatakeyama
National Institute of Materials and Chemical Research, Higashi 1-1, Tsuchiura, Ibaraki 305-8565, JAPAN

**Composites from Recycled Wastes (2): 3.30pm - 5.30pm, Chair: Ryszard Kozlowski**

**A Recent Progress in Carbonized TiO2-Wood Composites for Environmental Cleaning**
Shinsuke Saka
Department of Socio-Environmental Energy Science, Graduate School of Energy Science, Kyoto University, Kyoto 606-8501, JAPAN

**Post-Consumer Wood Waste as Raw Material for Particleboard and MDF**
Stefan Wolf
Technology Department, Wood Division, G. Sempelkamp GmbH & Co. Maschinen- und Anlagenbau, GERMANY

**Managing Secondary Resources from Conventional Wood Composite Materials: Practical Issues in Resource Utilisation**
Matthew Warzinski, R. E. Gonzalez, and Philip Karajayli
New South Wales Waste Boards, AUSTRALIA

**Some Properties of Charcoal Made from Sawdust Composite**
Takayasu Takeda, Volante E. Gonzalez, Hirofumi Kasahara, Kohei Ando, and Masayuki Yonezawa
Faculty of Agriculture, Tottori University, Koyama, Tottori, 680-0945, JAPAN

**Thermal and Mechanical Properties of Polyurethane Composites Containing Wood Powder and Coffee Grounds**
Hiroshi Hatakeyama, Daisuke Kamakura, Shigeo Hirose, Tatsuko Hatakeyama, and Ryoshi Tanka
Faculty of Agriculture, Tottori University, Koyama, Tottori, 680-0945, JAPAN

**Species Effects on Mechanical Properties of Polystyrene Films from Liquefied Wood Grounds**
T. Kikuchi, A. Kamata, S. Doo, Y. Taniwa, and H. Ono
Institute for Wood Technology, Akita Prefectural University, Kaisekura 1-1-1, Akita, 016-0846, JAPAN

**Possibility of Methanol Production from Wood-Based Waste Materials**
Tosio Hayashi
National Institute of Agricultural and Life Science, The University of Tokyo, Tokyo, JAPAN
Effect of Point of Preservative Application on Decay Resistance of Strandboard
Goroyias G. J. and Hale M. D.
The Biocomposites Centre, University of Wales, Bangor, UK

Cure Rate Assessment of UF Resin Using FT-IR and NIR Spectroscopy
Wassim Gregory and Ayman Tamer
Manufacturing, Forest Research, Private Bag 3020, Rotorua, NEW ZEALAND

Evaluation of the Hybrid Drying Method of Wood using HF and Hot-Air Through Moisture Movement and Energy Consumption
Yoshimori Kaburada, Yasuo Kawai and Orlando R. Pulido
Institute of Wood Technology, Akita Prefectural University, 11-1 Kaeziaka Noshiro, Akita 016-8876 JAPAN

Dimensional Stability and Flame Resistance of Barium Hydrogenphosphate-Acetylated and -Propionylated Wood Composites
Jian-Zhang Li, Takeshi Furuno and Sadanobu Katoh
Faculty of Science and Engineering, Shimane University, Matsue City, JAPAN

Surface Hardening Techniques for Softwood Products for Interior Use
Hitomori Tamachi and Yamaki Anazawa
1Iwate Prefectural Forestry Technology Center, JAPAN
2Iwate Prefectural Industrial Technology Center, JAPAN

Measuring Strand-Orientiation in OSB by Means of X-ray Computed Tomography
Rupert Wimmer, M. Paulus, P. Winistorfer and G. Downes
1CSIRO Forestry and Forest Products, GPO Box 252-12 Hobart TAS 7001, AUSTRALIA
2Oak Ridge National Laboratory, Oak Ridge, TN 37831-6066, USA
3Tennessee Forest Products Center, University of Tennessee, Knoxville, TN 37901-1071, USA

Effective Extraction of Tannins from the Bark of Radiata Pine
Shinichio Murota
Kagoshima Prefectural Institute of Industrial Technology, JAPAN

Improved Liquid Impregnation into Wood by Roller-pressing Method in the Treatment Solution
Munafumi Inoue, Koji Adachi and Shinichi Kawai
Wood Research Institute, Kyoto University, JAPAN

Press Cycle Development for Panels of Bio-Based Materials
Steve Kirincic, Steve J. Flannery and Bruce Mathis
1Alberta Research Council, CANADA
2Isobord Enterprises Inc. CANADA

The Resistance of Polystyrene Wood to the Dry-Wood Termite (Cryptotermes cyanochalips) and the Subterranean Termite (coptotermes curvignathus) Infestation
Jasni1, N. Hadjib1, Jasni and Barly2, Y. S Hadi1, Y. Afiduddin1
1Forest Products Research Institute, Bogor, INDONESIA
2Bogor Agricultural University, Bogor, INDONESIA

Comparative Resistance of Cement-bonded Rubberwood Particleboard, Rubberwood Medium Density Fibreboard, Rubberwood and Radiata Pine to Microfungi Subterranean Termite Attack
Andrew H.H. Wong1 and A.L. Chen2
1Forest Research Institute of Malaysia, Kepong, Selangor, 52109 Kuala Lumpur, MALAYSIA
2Hume Creamboard Berhad, Chemborg industrial Estate, 71300 rembau, Negeri Sempilan Darul Khuais, MALAYSIA

Structural Flakeboard from Mixed Hardwood Species
Donnall P. Karrdern1 and Lawrence Marin1
1Faculty of Forestry, Michigan State University, East Lansing, Michigan 48824, USA
2School of Forestry and Wood Products, Michigan Technological University, Houghton, Michigan 49931, USA

Impact of Village Tree Species on Physical and Mechanical Properties of Hardboard in Khulna Hardboard Mills Ltd., Bangladesh
M.O. Hannan and G Benazir
Forestry and Wood Technology Discipline, Khulna University, Khulna-9208, Bangladesh

Structural Integrity of Carbon Fiber-Reinforced Composites During Fire
Orlando R. Pulido, Luig Foi Ma, Hidehumi Yamamichi, Hikari Sasaki and Shinichi Kawai
Institute of Wood Technology, Akita Prefectural University, 11-1 Kaeziaka Noshiro, Akita 016-8876 JAPAN

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Donnall P. Karrdern1 and Lawrence Marin1
1Faculty of Forestry, Michigan State University, East Lansing, Michigan 48824, USA
2School of Forestry and Wood Products, Michigan Technological University, Houghton, Michigan 49931, USA

The Development of Hybrid Poplar Processing Industry in P. R. China
Hua Yukun and Zhou Xiaoyan
Nanjing Forestry University, Nanjing, 210037, CHINA

The Utilization of Agricultural Residue in China
Zhou Dingguo and Zhang Yang
Nanjing Forestry University, Nanjing, 210037, CHINA

Particleboard from Sunflower Stalks and Tannin-Modified UF Resin
Zeinab Abd El Rahim Osman, P. Khristova, N. Yossifov, S. Gabit and I. Glavchev
National Center for Research, Institute for Technological Research, Po Box 2404, Khartoum, SUDAN
Wednesday 13th December 2000, 9.00am - 12.30pm: Concurrent Sessions

Session 1 – Michigan Room

Wood-Plastic Composites (1): 9.00am - 10.30pm, Chair: Armando McDonald

Injection-Molded Plastic Composites from Maize Fibers and Polypropylene
Poo Chow1, Charlie T. Bowers2, John A. Youngquist3, Nicole M. Stark1, Jim M. Muehl1 & Andrezej M. Krzysik3
1University of Illinois - Urbana, Illinois, USA
2U. S. Forest Products Laboratory, Madison, Wisconsin, USA

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1University of Illinois - Urbana, Illinois, USA
2U. S. Forest Products Laboratory, Madison, Wisconsin, USA

Ultraviolet Weathering of Wood-Fiber/Plastic Composites
Laurent Matuana1 and Donatien Kamden2
1School of Forestry and Wood Products, Michigan Technological University, Houghton, Michigan 49931, USA
2Faculty of Forestry, Michigan State University, East Lansing, Michigan 48824, USA

Utilization of Lignocellulosic Thermoplastic Prepreg in Polyester Composites
Abdul Khalil1, M. Nasir1, M.N. Ahmad2 and H. Ismail2
1School of Industrial Technology, University of Malaysia, 11800 Penang, MALAYSIA
2School of Forestry of Belgrade University, Knezaviveslava No. 1, Belgrade, 11030, YUGOSLAVIA

The Effects of Isobutyl Caoutchouc Addition on Some Properties of Polypropylene Wood Fibre Composites
Jovan Miljkovic1, 2 and Milanka Djiporovic1
1Faculty of Forestry of Belgrade University, Knezaviveslava No. 1, Belgrade, 11030, YUGOSLAVIA
2Chemical Industry “HIPOL”, Odzaci.

Wood-Plastic Composites (2): 11.00pm - 12.30pm, Chair: Orlando Pulido

Wood Fibre-Plastic Composite Materials for Injection Moulding
Brendan Lee and Armando McDonald
Material Discovery Group, Forest Research, Private Bag 3020, Rotorua, NEW ZEALAND

Oil Palm Empty Fruit Bunch-Polypropylene Composites
G.A. Manarpaac1, K. Zaman2 and J. Harun3
1College of Forestry, Mindanao State University, 9700 Marawi City, PHILIPPINES
2Faculty of Agriculture, Kyoto Prefectural University, JAPAN
3School of Forestry of Belgrade University, Knezaviveslava No. 1, Belgrade, 11030, YUGOSLAVIA

Manufacture of Wood Fibre-Biodegradable Polymer Composites
S. Pettersson, K. Jayaraman and Diffen Bhattacharya
Centre for Composites Research, School of Engineering, University of Auckland, Auckland, NEW ZEALAND

Physical and Mechanical Properties of Three Polystyrene Indonesian Woods
N. Hadji1, Barfy2, Yingfei Hu3 and L.G.K.T. Dumir1
1Forest Products Research Institute, Bogor, INDONESIA
2Bogor Agricultural University, Bogor, INDONESIA

Session 2 – Superior Room

Fire Resistance of Composites: 9.00am - 10.30pm, Chair: Shuichi Kawai

YAMAHA Developed and Commercialized the Noncombustible Woods in Japan
Keiichi Muramatsu, Koichi Ohtani, Shouji Shimano and Makoto Miyazaki
Technical Development Division, Yamaha Corporation, 283 Aoya-Cho, Hamamatsu-Shi, Shizuoka 435-8567, JAPAN

The Role of Boric Acid in the Pyrolysis and Fire Retardation of Wood
Li Jian and Wang Qingsen
Research Institute of Wood Science and Technology, Northeast Forestry University, 26 Hexing Road, Harbin 150040, CHINA

Lignocellulosic-Intumescent Vermiculite Composite Boards
R. Kozlowski, R. Mieleńk, Z. Małkowski and R. Mudziejewski
Institute of Natural Fibres, 71B Wojcik Polskich St., 60-630 Poznan, POLAND

A Recent Progress in Fire-Resisting Wood-Inorganic Composites Prepared by the Sol-Gel Process
Houhei Miyafuji and Shiro Saka
Department of Socio-Environmental Energy Science, Graduate School of Energy Science, Kyoto University, Kyoto 606-8501, JAPAN

Deterioration & Preservation of Composites: 11.00pm - 12.30pm, Chair: Peter Laks

Zinc Borate as a Preservative Treatment for Bio-Based Composites
Mark Manning
U.S. Borax, Valencia, California, USA

Improvement of Liquid Penetration into Tropical Hardwood by Precompression Treatment
Salmanun Yataj, Bakhoo Ida and Yoji Iinuma
RIEO Center for Applied Physics, LIP, INDONESIA
1Faculty of Agriculture, Kyoto Prefectural University, JAPAN
2Wood Research Institute, Kyoto University, Uji, Kyoto, 611, JAPAN

Decay and Termite Resistance of Thermoplastic/Wood Fiber Composites
Peter E. Ludy and Steven A. Verhey
School of Forestry and Wood Products, Michigan Technological University, Houghton, Michigan USA

Comparative Study on Decay Resistance through Stem Wood from Sapwood to Pith between Plantation and Natural Teak
Keichi Yamamoto
Forestry & Forest Products Research Institute, PO Box 16, Tsukuba Norin Kenkyu, Ibaraki, 305-8687, JAPAN
Australian Research on Bio-based Composites

Session Chair: Phil Evans

Natural Fibre Cements - An Australian Perspective

Robert S. P. Coutts

Ascedo Pty. Ltd., 75 Sandringham Road, Sandringham 3191, AUSTRALIA

Effects of Paper Type and UF Resin Treatment on Surface Quality and MF Resin Distribution in Treated Pressed Décor Paper

Ray Roberts, Tim Senden and Phil Evans

Centre for Science and Engineering of Materials, The Australian National University, Canberra, AUSTRALIA

New Wood-based Materials "Torgvin" and "Vintorg"

Grigory Torgovnikov and Peter Vinden

School of Forestry, University of Melbourne, Creswick, Victoria 3363 AUSTRALIA

The Future for Wood Composites in Australia

David Robson\(^1\) and Michael Blyth\(^2\)

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Prizes, Presentations and Closure