2015 세계산불총회
International Wildland Fire Conference
PYEONGCHANG KOREA

KNU 강원대학교

# International Symposium for the 40th Anniversary of the Institute of Forest Science

- **Date**
  October 13 (Tue), 2015
- **Venue**
  Alpensia Convention Center & Yongpyong Resort,
  Pyeongchang, Gangwon-do
- **Organizer**
  The Institute of Forest Science at Kangwon National University
- **Sponsors**
  College of Forest and Environmental Sciences at Kangwon National University
  Gangwon-do
  Eastern Regional Office of Korea Forest Service

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## □ Program

| Time | Content | Speaker | Venue |
|---|---|---|---|
| 09:30~10:00 | Registration | | Alpensia Convention Center Auditorium |
| 10:00~10:15 | Opening | Vice Dean Hee Mun Chae (College of Forest and Environmental Sciences, Kangwon National University) | |
| | Welcoming Address | Director Jungkee Choi (Institute of Forest Science, Kangwon National University) | |
| | Congratulatory Address | Vice Governor Sung Kyu Maeng (Gangwon-do)<br>Director General Kyoung-il Lee (Eastern Regional Office of Korea Forest Service)<br>Dean Hyun-Kil Jo (College of Forest and Environmental Sciences, Kangwon National University) | |
| 10:15~10:20 | Photo Time | | |
| 10:20~10:45 | Forest Degradation and Restoration Strategy of North Korea | Emeritus professor Chong-Hwa Park (Seoul National University, Korea) | |
| 10:45~11:10 | Future Forest Management Strategy in a Changing Climate Sediment-related Disaster Prevention Measures in Response to Increasing Rainfall Intensity | Emeritus professor Tsugio Ezaki (Ehime University, Japan) | |
| 11:10~11:35 | Forest Harvesting Systems a Tool for Forest Management | Professor Han-Sup Han (Humboldt State University, USA) | |
| 11:35~12:00 | Selective Management System of Malaysian Forests : Current Status and Future Challenges | Professor Mohd Zaki Hamzah (Universiti Putra Malaysia, Malaysia) | |
| 12:00~14:00 | Luncheon | | |

| | Session 1 (Sapphire Room, Tower Condo) | Session 2 (Sapphire Room, Tower Condo) | Session 3 (Crystal Room, Tower Condo) | Session 4 (Rainbow Room, Greenpia Condo) | |
|---|---|---|---|---|---|
| 14:00~18:00 | Forest Fire Management and Meteorology | Forest & Environment Management and Conservation for Future Generation | Recent Advances in the Research of Forest Biomaterials | Ecological Landscaping and Green Leisure | Yongpyong Resort |
| 18:30~20:00 | Banquet | | | | |

## □ Session 3. Recent Advances in the Research of Forest Biomaterials

| Time | Title | Authors |
|---|---|---|
| 14:00~14:25 | Nanomechanical Measurements and Cellulose Nano Material Development at University of Tennessee | **Siqun Wang**, Xinzhou Wang, Yujie Meng, Libo Ma, Dong Xing, Yurong Wang, Jingjing Fu, Deliang Xu |
| 14:25~14:50 | Preparation of Lgnin-based Carbon Nanofiber Materials as a Supercapactior Electrodes | **Yong Sik Kim**, Won-Jae Youe, Soo-Min Lee, Byoung-Jun Ahn, Sung-Suk Lee |
| 14:50~15:15 | Application of the Ion Complex PAM Copolymer for Dry-strength Agent | **Kyoung Mo Jeong**, Seong Moon Yong, Jong Myoung Won, Yong Kyu Lee, Hwa Myung Joo |
| 15:15~15:40 | Research Trend on Wood Processing Techniques and Advanced Wooden Materials at Korea Forest Research Institute | **Sang-bum Park**, Min Lee, Sang-min Lee, Jin-suk Suh, Dong-won Son, Won-joung Hwang, Sang-jin Chun, Sun-young Lee |
| 15:40~16:00 | Break Time | |
| 16:00~16:25 | Cell Death Mechanism by Phenolic Derivatives through ER Stress in Human Breast Cancer Cells in *vitro* | **Thamizhiniyan V.**, Min-Ji Jeong, Young-Woong Choi, Eun-Jin Park, Young-Kyoon Kim |
| 16:25~16:50 | Effects of the Twin-screw Extrusion on the Pretreatment using Ionic Liquid | **Song-Yi Han**, Bo-Yeon Kim, Chan-Woo Park, Seung-Hwan Lee |
| 16:50~17:15 | Thermal Modification of High Density Wood: Effect of Clamping Methods and Treatment Parameters on the Properties of Okan (*Cylicodiscus gabunensis* [Taub.] Harms) | **Wahyu Hidayat**, Jae Hyuk Jang, Fauzi Febrianto, Nam Hun Kim |
| 17:15~17:40 | Strength Improvement of Industrial Grade Papers by Application of Black Liquor | **Byoung-Uk Cho** |

# Thermal Modification of High Density Wood: Effect of Clamping Methods and Treatment Parameters on the Properties of Okan (*Cylicodiscus gabunensis* [Taub.] Harms)

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**Abstract**

Thermal modification or heat treatment of wood is the application of heat to the wood in order to bring about a desired improvement in the performance of the material. Most of the previous studies have discussed the heat treatment of low to medium density woods, while heat treatment of high density wood as Okan (*Cylicodiscus gabunensis* [Taub.] Harms) has rarely been studied. The objective of this study was to evaluate the effect of clamping methods, temperature, and time during heat treatment on the properties of Okan. Two series of experiment were conducted: to evaluate the effect of temperature, heat treatment was performed at 160 °C, 180 °C, 200 °C, and 220 °C for 2 h; and to evaluate the effect of treatment time, heat treatment was performed at 180 °C for 1, 2, 3, and 4 hours. The color change (ΔE*), weight loss, and volume shrinkage increased with increasing temperature and time, whereas the equilibrium moisture content (EMC) and water absorption (WA) decreased. The wood density was not much affected by temperature and time due to balance reduction of weight and volume. The clamping method affected ΔE*, weight loss, volume shrinkage, EMC, and WA was affect in both types of wood. A significant reduction in the mechanical properties occurred after heat treatment at 200 °C and 220 °C.

**Keywords:** Okan wood, heat treatment, temperature, treatment time, clamping method, physical and mechanical properties