

# ISGMA 2014

International Symposium on  
Green Manufacturing and Applications



June 24 (Tue) - 28 (Sat), 2014

Paradise Hotel, Busan, Korea

## 27 Friday

	Session A-7 Grand Ballroom 1 & 2	Session B-7 Napoli	Session C-7 Venice	Session D-7 Miami
	Bio Energy and Biotechnology I	Energy Harvesting	Advanced Material I	Machining and Grinding
	Chairs Dong-Gyu Ahn Hwai Chyuan Ong	Chairs Dong Rip Kim Yong Jin Yoon	Chairs Hoon Eui Jeong Young-Bin Park	Chairs Dave (Daw-Wook) Kim Dong-Yoon Lee
9:00-10:15	Kinetics and Thermodynamics Investigation of Supercritical Reactive Extraction using Jatropha Curcas L. Seeds for Biodiesel Production (Steven Lim)	An Electromagnetic Energy Harvester with High-efficiency Windmill-structure for Wireless Sensor Application (Xuan Wu)	Synthesis and Characterization of Ionic Liquid Mediated Reduced Graphene Oxide-TiO <sub>2</sub> Hybrid Material for DSSC (Varsha Khare)	Analysis of Variation of Specific Cutting Resistance in Machining of High Aspect Ratio Channels (Hwan-jin Choi)
	An Investigation of Oil Palm Wastes Pyrolysis by Thermo gravimetric Analyzer for Potential Biofuel Production (Noorhaza Alias)	Coplanar Microfluidic Channels Based Reduction Technology of Oxidized Galinstan Applied for Energy Harvesting (Guangyong Li)	Influence of Flame Retardant Fillers on Fire Protection and Mechanical Properties of Intumescent Coatings for Steel (Ming Chian Yew)	Design and Analysis of a Cost-efficient and Accurate Micro Machine Tool with Hybrid Toggle Structure (Shih-Ming Wang)
	Green Techniques to Process Natural Products from Fruits and Their By-Products (Kashif Ghafoor)	Effect of Parameters on the Performance of Rotary Magnetostrictive Energy Harvester (Young-Woo Park)	Improving Mechanical and Fire Retardant Properties of Bio-Based Filler Reinforced Polypropylene (Atta Ur Rehman Shah)	A Vision-based On-machine Measurement and Compensation Method of Micro Machining Error for Micro Machine Tools (Guan-Shiang Wang)
	Improvement of Cyclodextrin Glycosyltransferase (CGTase) Secretion by Recombinant Escherichia Coli Immobilized on Hollow Fibe Membrane using Full Factorial Design (Rohaida Che Man)	Investigations of a Bistable Energy Harvester by Harmonic Balance Method (Dung-An Wang)	Performance of Biocomposites Reinforced by Cellulose Nanofiber Obtained from Paper Wastes (Hitoshi Takagi)	Turning of Hardened Martensitic Stainless Steel with Minimum Quantity of Lubricant using Castor Oil (Denni Kurniawan)
	Simulation of Cell Differentiation Process based on a Mechano-regulation Theory using Deviatoric Strains (Han-Young Lee)	Cellulose-ZnO Hybrid Nanocomposite for Vibration Energy Harvesting (Seongcheol Mun)	Quantitative Assessment of Friction of Automatically Thin MoS <sub>2</sub> (Koo-Hyun Chung)	Application of Magnetic Assisted Polishing to Removal Process of Micro-burr Created by Grinding Process inside the Micro-hole (Myung-Won Jung)
10:15-10:25	Coffee Break			

- B-7-2 **Coplanar Microfluidic Channels Based Reduction Technology of Oxidized Galinstan Applied for Energy Harvesting**  
*Guangyong Li, Dong-Weon Lee (Chonnam Nat'l Univ.)*
- B-7-3 **Effect of Parameters on the Performance of Rotary Magnetostrictive Energy Harvester**  
*Y. W. Park, H. S. Kang, M. Noh (Chungnam Nat'l Univ.)*
- B-7-4 **Investigations of a Bistable Energy Harvester by Harmonic Balance Method**  
*Huu-Tu Nguyen, Dung-An Wang (Nat'l Chung Hsing Univ.)*
- B-7-5 **Cellulose-ZnO Hybrid Nanocomposite for Vibration Energy Harvesting**  
*Seongcheol Mun, Seung-Ki Min, Jongbeom Im, Mithilesh Yadav, Jaehwan Kim (Inha Univ.)*

## Session C-7 Advanced Material I

*Chairs : Hoon Eui Jeong, Young-Bin Park*

**Friday, June 27, 9:00 - 10:15, Room : Venice**

- C-7-1 **Synthesis and Characterization of Ionic Liquid Mediated Reduced Graphene Oxide-TiO<sub>2</sub> Hybrid Material for DSSC**  
*Varsha Khare, Shiva Raj Poudel, Sung-Yong Kim, Ji-Hyeon Song (Seoul Nat'l Univ.), Caroline Sunyong Lee (Hanyang Univ.), Sung-Hoon Ahn (Seoul Nat'l Univ.)*
- C-7-2 **Influence of Flame Retardant Fillers on Fire Protection and Mechanical Properties of Intumescent Coatings for Steel**  
*Ming Chian Yew, N. H. Ramli Sulong, Ming Kun Yew, M. A. Amalina, M. R. Johan (Univ. of Malaya)*
- C-7-3 **Improving Mechanical and Fire Retardant Properties of Bio-based Filler Reinforced Polypropylene**  
*Atta ur Rehman Shah, Dong-Woo Lee (Changwon Nat'l Univ.), Byung-Sun Kim (Korea Inst. of Material Sciences), Jung-Il Song (Changwon Nat'l Univ.)*
- C-7-4 **Performance of Biocomposites Reinforced by Cellulose Nanofiber Obtained from Paper**  
*Hitoshi Takagi, Antonio N. Nakagaito, Satoshi Sugano, Yuya Muneta (Univ. of Tokushima), Jitendra K. Pandey (Univ. of Petroleum and Energy Studies)*
- C-7-5 **Quantitative Assessment of Friction of Atomically Thin MoS<sub>2</sub>**  
*Bien Cuong Tran Khac, Koo-Huyn Chung (Univ. of Ulsan)*



# Coplanar Microfluidic Channels Based Reduction Technology of Oxidized Galinstan Applied for Energy Harvesting

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KEYWORDS : Microfluidic Channels, Liquid Metal, Oxidized Galinstan, Energy Harvesting

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*In this paper, a gas permeable PDMS (polydimethylsiloxane) based coplanar microfluidic channel is used for recovering the non-wetting characteristic of oxidized Galinstan. Galinstan in the microfluidic channel is surrounded by another coplanar channel filled with HCl solution. Because of excellent permeability of PDMS, HCl can permeate through PDMS wall between two channels (interchannel PDMS wall) and achieve continuous chemical reaction with oxidized Galinstan. Subsequently, Galinstan behaves like true liquid in the microfluidic channel. Firstly, The behavior of reduced Galinstan oxide is analyzed in a PDMS-based coplanar microfluidic channels fabricated by simple micromolding technique. Meanwhile, the droplet volume and formation frequency at different flow rates are characterized by Lab VIEW based syringe pump system. After that, a larger Galinstan droplet array is obtained and the kinematics characteristics are analyzed. Finally, this reduction technology of oxidized Galinstan is applied to reverse electrowetting based energy harvesting. The experiment results demonstrate that this method is working very well in electronic device applications.*

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