ISNIT 2017

10th International Symposium on Nature-Inspired Technology

June 28-July 1, 2017
Jpark Island Resort & Waterpark, Cebu, Philippine

Technical Program

The Executive Committee reserves the right to amend the program if necessary.

ISNIT 2017 Program Schedule (June 28 – July 1, 2017)

Wednesday, JUNE 28

16:00-19:00	**Conference registration and Check-in**
18:00-20:00	**Welcome Reception** (Triphora Room)

Thursday, JUNE 29

08:00-18:00	**Conference registration and Check-in** (Grand Ballroom Triton)
08:30-09:00	**Opening Remarks**
09:00-09:45	**Plenary Presentation I** Shigeru Deguchi, *Japan Agency for Marine-Earth Science and Technology, Japan*
09:45-10:30	**Plenary Presentation II** Hyouk Ryeol Choi, *Sungkyunkwan University, Korea*
10:30-10:50	**Coffee Break**
10:50-11:35	**Plenary Presentation III** Lei Jiang, *Institute of Chemistry, Chinese Academy of Sciences (ICCAS), China*
11:35-12:20	**Plenary Presentation IV** Kurisawa Motoichi, *Institute of Bioengineering and Nanotechnology, Singapore*
12:20-14:00	**Lunch**
14:00-14:30	**Invited I**, Nature-Inspired Sensors and Actuators, Inkyu Park, *KAIST*, *Korea*
14:30-15:00	**Invited II**, Nature-Inspired Fluid Dynamics, Xu Hou, *Xiamen University*, *China*
15:00-15:30	**Invited III**, Nature-Inspired Surfaces and Structures, Syuji Fujii, *Osaka Institute of Technology*
15:30-16:00	**Invited IV**, Nature-Inspired Materials, Seung Woo Cho, *Yonsei University, Korea*
16:00-17:30	**Poster Session**
18:30-22:00	**Conference Banquet** (Outdoor or Triton)

Friday, JUNE 30

08:30-10:30	**Session F1A** Nature-Inspired Robotics and Biomechanics (oral 6)	**Session F1B**, New Discovery for Smart and Fusion Technology (oral 6)
10:30-10:50	Coffee Break	
10:50-12:30	**Session F2A**, Nature-Inspired Surfaces and Structures I (invited 1, oral 3)	**Session F2B**, Nature-Inspired Materials I (invited 2, oral 2)
12:30-14:00	**Lunch**	
14:00-16:00	**Session F3A**, Nature-Inspired Fluid Dynamics (invited 1, oral 5)	**Session F3B**, Nature-Inspired Sensors and Actuators (invited 2, oral 3)
16:00-16:20	Coffee Break	
16:20-18:00	**Session F4A**, Nature-Inspired Surfaces and Structures II (invited 1, oral 3)	**Session F4B**, Nature-Inspired Materials II (invited 2, oral 2)

Saturday, JULY 1st

09:00-12:00	Special session of research consortiums
12:00-12:30	Closing Remarks & Conference Adjourns

Poster/Oral presentations are listed by topic category with their assigned number starting on page3

T5P10 **Preparation of microspheres using 512 channel geometrical passive breakup microfluidic device**
Chul Min Kim, Gym Man Kim (Kyungpook National University, Korea), Jin Ho Choi (Gumi University, Korea), and Han Byul Lee (Kyungpook National University, Korea)

T5P11 **Fabrication of microfluidic device having an embedded membrane with pore array**
Jong Uk Kim, Gyu Man Kim (Kyungpook National University, Korea), Jin Ho Choi (Gumi University, Korea), and Han Byul Lee (Kyungpook National University, Korea)

T6P Nature-Inspired Sensors and Actuators

T6P01 **Bio-mimetic and multimodal nanoporous cantilever sensor for high sensitive detection and discrimination**
Minwoo Kim, Woong Kim, Joohyung Park, Seongjae Jo, Woochang Kim, Chihyun Kim, and Jinsung Park (Korea University, Korea)

T6P02 **Colorimetric opal film based on humidity-dependent color change of a Isabellae longhorn beetle**
Han-Bok SEO, and Seung-Yop LEE (Sogang University, Korea)

T6P03 **Biomimetic tactile sensor**
Youngdo Jung (Korea Institute of Machinery and Materials, Korea)

T6P04 **Patchable temperature sensor mimicking transient receptor potential ion-channel**
Jung-Soo Kim, Kyung-Yong Chun, and Chang-Soo Han (Korea University, Korea)

T6P05 **Peptide Nanowire-based Biomimetic Structural Color Production and Their Applications**
Gyuyeob Oh, Gyu Yeol Park, Wonbin Song, Do Hoon Lee, and Byung Yang Lee (Korea University, Korea)

T6P06 **Self-assembled color in structured cellulose nanocrystal-based colorimetric sensors**
Hyun Soo Kim, Ye Rim Lee, Hyungho Kwon, Taewan Kim, Gyuyeob Oh (Korea Univ., Korea), Byung Yang Lee (Korea University, Korea)

T6P07 **Crack-inspired nanofluidic nanowire synthesis and bio-/chemical nanosensor application**
Taesung KIM, and Dong-Joo KIM (Ulsan National Institute of Science and Technology (UNIST), Korea)

T6P08 **Facile fabrication of flexible and scalable three-dimensional plasmonic nanoarchitectures by roll-to-roll nanoimprinting along with angled metal deposition**
Jung-Sub Wi (Korea Research Institute of standards and Science, Korea), Seungjo Lee, Dong Kyo Oh (Seoul National University of Science and technology, Korea), Kyu-Tae Lee (University of Illinois at Urbana-Champaign, United States), Inkyu Park (KAIST, Korea), Moonkyu Kwak (Kyungpook National University, Korea), Jae Hyuk Lee, Jung Dae Kim, and Jong G. Ok (Seoul National University of Science and Technology, Korea)

T6P09 **Improvement of Bitterness Membrane of Taste Sensor for Medicine**
Xiao Wu, Hideya Onitake, Zhiqin Huang, Yusuke Tahara, Kiyoshi Toko, and Hidekazu Ikezaki (Kyushu University, Japan)

T6P10 **A novel triboelectric nanogenerator for self-powered sensor applications**
Jingui Qian, Dong-Su Kim, and Dong-Weon Lee (Chonnam national university, Korea)

T6P11 **A study on the reliability of pressure sensor suitable for Shock environment**
Kyung Eun Park, Jae Heon Park, Hyang Duck Cho (A-technology.co., and ltd., Korea)

T6P12 **Mimicking the self-burial behavior of erodium seed using highly concentrated poly(N-isopropylacrylamide) gel**
Andrew Choi, and Dong sung Kim (Pohang University of Science and Technology, Korea)

A novel triboelectric nanogenerator for self-powered sensor applications

Jingui Qian[1], Dong-Su Kim[1] and Dong-Weon Lee[1*]

[1]Mems and nanotechnology laboratory, Department of Mechanical Engineering, Chonnam national university, Gwangju 61186, South Korea
*E-mail : mems@jnu.ac.kr, Tel: +82-062-530-1684

Currently, the power supply of the wireless sensor of available commercial tire pressure monitoring systems (TPMS) still relies on the high-temperature lithium battery, which exhibit several drawbacks such as low durability, replacement difficulty, and inferior sustainability in terms of environmental impact [1]. Therefore, developing miniaturized energy harvesting devices to be employed in TPMSs have grown in recent years [2]. This research proposed a magnetically rotational triboelectric nanogenerator (MR-TENG) integrated with high-efficiently supercapacitor for TPMS application. The designed MR-TENG is consisting of different triboelectric materials with opposite polarities based on the contact mechanism. The unique advantage of balanced seesaw structure is to overcome the influence of large centrifugal force at a high operating speed. Moreover, two permanent magnets mounted on the brake caliper are employed to actuate a periodic separation-contact motion. The high output performance has been achieved among the wide ranges of rotational speed and magnetic force through systematically experiments test. The MR-TENG at the rotation speed of 100 rpm can deliver a maximal output voltage 300 V and a corresponding power of 9.86 mW at a load of 3 MΩ under a constant magnetic field strength of 0.2 T. After integrated with high-efficient supercapacitor energy storage unit, the MR-TENG as a direct power source have been demonstrated that, a wireless sensor of commercial TPMS can be sustainably powered by the MR-TENG and its charge system for sending the real-time temperature and air pressure data to a receiver display.

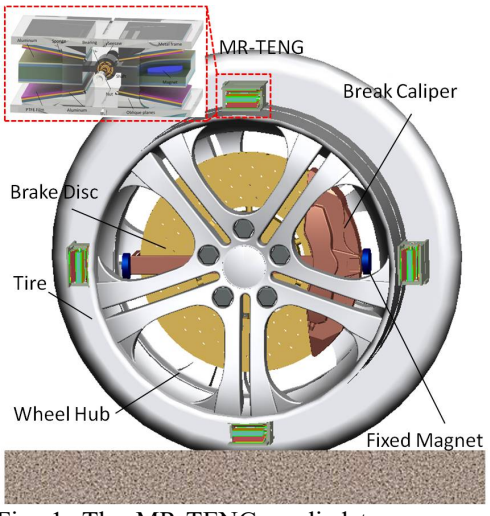

Fig. 1. The MR-TENG applied to scavenge mechanical energy of rotating tires for TPMS

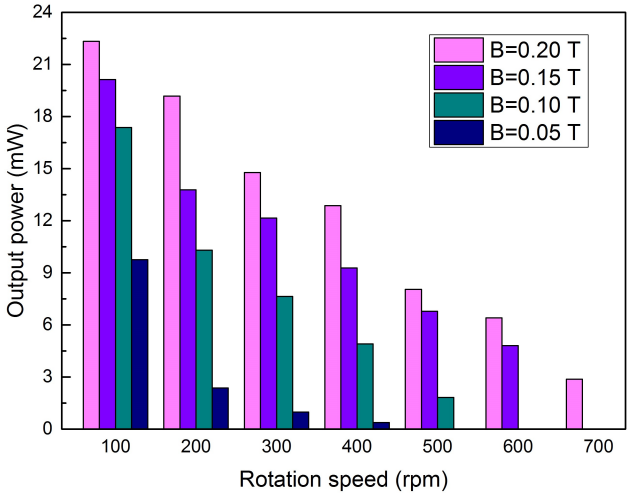

Fig. 2. The output performance of the MR-TENG with various rotation speed and magnetic field strength.

References

[1] X. Wu, M. Parmar, D.W. Lee, IEEE/ASME T Mech, Vol. 5, 1514-1522 (2014)
[2] E. R. Westby, E. Halvorsen, IEEE/ASME T Mech, Vol. 17, 995-1005 (2012)