WORKSHOP PROGRAM

15th International Workshop on Nanomechanical Sensing
(June 26-29, 2018)

Organized by

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Indian Institute of Science Education and Research, India

55. Single strand organic electrochemical transistor-based ion concentration sensors for wearable health monitoring systems

Youngseok Kim[1], Seong-Min Kim[1], Taekyung Lim[2], Sanghyun Ju[2] and Myung-Han Yoon[1]
[1]Gwangju Institute of Science and Technology, South Korea
[2]Kyonggi University, South Korea

56. Resonant hair humidity sensors: Revisit the hair hydrometer

Yeowon Yoon and Jungchul Lee
Sogang University, South Korea

57. Polymer tip attached quartz tuning forks for shear force atomic force microscopy

Juhee Ko[1], DasomYang[2], Amun Jarzembski[3], Keunhan Park[3], Wonhyoung Ryu[2] and Jungchul Lee[1]
[1]Sogang University, South Korea
[2]Yonsei University, South Korea
[3]Universityof Utah, USA

58. Multi-modal quartz tuning fork with electrospun nanofibers for hydrogen gas sensing

Danny Wong[1], Allen Sandwell[1], Juhee Ko[2], Jungchul Lee[2] and Simon S. Park[1]
[1]University of Calgary, Canada
[2]Sogang University, South Korea

59. Measurement of the glass transition temperature of a freestanding polymer nanofiber

Wuseok Kim, Hyeonjeong Lee, Gwanho Kim and Sangmin Jeon
Pohang University of Science and Technology, South Korea

60. Microcantilever array instrument based on optical fiber and performance analysis

Qingchuan Zhang, Guangping Zhang and Shangquan Wu
University of Science and Technology of China, China

61. Electric eel inspired multi-stack nanofluidic power generation

Cong Wang[1], Eunpyo Choi[2] and Jungyul Park[1]
[1]Sogang University, South Korea
[2]Chonnam National University, South Korea

62. Hydrogel-driven portable energy harvesting system

Jaedeok Seo, Cong Wang, Jungyul Park and Wonjung Kim
Sogang University, South Korea

63. Nanoarchitecture of a ZnO/V_2O_5 core-shell photoanode for photoelectrochemical water splitting

Tian-Feng Hou, Arunkumar Shanmugasundaram, Dong-Weon Lee and Sang-Wan Ryu
Chonnam National University, South Korea

Poster Session 1: Odd numbered posters (June 26, 10:30 am)

1. Characterization of 3D electrospinning on conductive inkjet patterned paper
Jinseong Kim and Jungyul Park
Sogang University, South Korea

3. Cost-effective educational vibrometer for static and dynamic measurement of MEMS resonators
Jihyung Kim[1], Yunhyuk Kang[1], Yeowon Yoon[1], Faheem Khan[2] and Jungchul Lee[1]
[1]Sogang University, South Korea
[2]Fourien Inc., Canada

5. Flexible temperature sensor mimicking ion channel with humidity insensitivity
Jungsoo Kim, Kyoungyong Chun and Chang-Soo Han
Korea University, South Korea

7. Study of sensing of ammonia by undoped and Cu doped tin oxide nanoparticles by Raman spectroscopy
Kakali Bhuyan[1,3], Priyanki Kalita[2], Dudumoni Bhuyan[3] Ayon Bhatacharjee[2] and P.R. Alapati[1,4]
[1]North Eastern Regional Institute of Science and Technology, India
[2]National Institute of Technology Meghalaya, India
[3]North Lakhimpur College, India
[4]Abdul Gani Khan Institute of Technology, India

9. Local temperature measurement by AFM-Thermoreflectance
Jinsung Rho and Bong Jae Lee
Korea Advanced Institute of Science and Technology, South Korea

11. Asymmetric microtube resonators for weighing microparticles when two resonance motion occurs
Donghyuk Lee[1], Gyomyung Shin[1], Yeowon Yoon[2], Sangken Kauh[1] and Jungchul Lee[2]
[1]Seoul National University, South Korea
[2]Sogang University, South Korea

13. Wide-range H_2 gas sensor based on suspended Pd nanoparticle/carbon nanomeshes
Seungwook Lee, Yeongjin Lim and Heungjoo Shin
Ulsan National Institute of Science and Technology, South Korea

15. An ultra-high interfacial capacitive pressure sensor based on solid-electrolyte for flexible electronics

Nanoarchitecture of a ZnO/V_2O_5 core-shell photoanode for photoelectrochemical water splitting

Tian-Feng Hou[1], Arunkumar Shanmugasundaram[1], Dong-Weon Lee[1] and Sang-Wan Ryu[2]
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Sustainble hydrogen production directly form the water and solar energy is a potential way to tackle the environmental and energy issuses. Semiconductor-based photoelectrochemical (PEC) water splitting has been considered as one of the most promising approaches in this field. To eanbale the practical applicaiton of PEC cell production, board light absorption, long-term stability and low-cost semiconducotrs are prerequisites. ZnO has been widely investigated because of the advantages of high electron mobility, abundant morphologies, easy synthesis, and low cost. However, it is suffered from narrow light-responseive range and the high recombination rate. Fabricating core-shell heterostructure with narrow bandgap material, which can not only extend the light absorption range but also effeciently promote charge separation, is an effective way to improve the PEC performance of ZnO photoanode. In present work, ZnO/V_2O_5 core-shell photoanodes were fabricated due to the fact that V_2O_5 is one important catalyst with a narrow bandgap (~2.2 eV) and has been received considerable interest due to its inherently good electrochemical and photochemical properties [1]. Different thicknesses of V_2O_5, controlled by the magetron sputtering depositon times of 300, 600, 900, 1200, 2400 and 3600 s, were deposited on the ZnO nanorod (NR) arrays grown by a hydrothermal method. The as-fabricated photoanodes were stuided by using field-emission scanning electron microscopy (FE-SEM), transmission electron microscope (TEM), X-ray diffraction (XRD), UV-visible spectroscopy, electrochemical impedance spectroscopy (EIS) and PEC measurements. The PEC performance measurements were performed in a 0.5-M Na_2SO_4 electrolyte solution under simulated light illumination at 100 mW/cm^2 using a three-electrode system. Results show that ZnO NRs were wrapped by a uniform thin layer of V_2O_5 (Figure 1(A)). The photocurrent densities of the ZnO/V_2O_5-based photoanodes are gradually increased with the sputtering time, reaching the maxium value of 1.15 mA/cm^2 at 1.23 V vs. RHE for the ZnO/V_2O_5-600 before decreasing with further increases in the V_2O_5 layer thickness, while the photocurrent density of pure ZnO-based photoanode is only 0.61 mA/cm^2 (Figure 1(B)). The enhanced PEC performance is attribute to the extension of light absorption range and improving of the electron-hole separation.

Acknowledgements
This work was founded by National Research Foundation of Korea (NRF) grant funded by the Korea government (MSIP) (No. 2015R1A4A1041746).

References
[1] M. R. Parida, C. Vijayan*, C. S. Rout, C. S. Sandeep, R. Philip, P. C. Deshmukh, "Room temperature ferromagnetism and optical limiting in V_2O_5 nanoflowers synthesized by a

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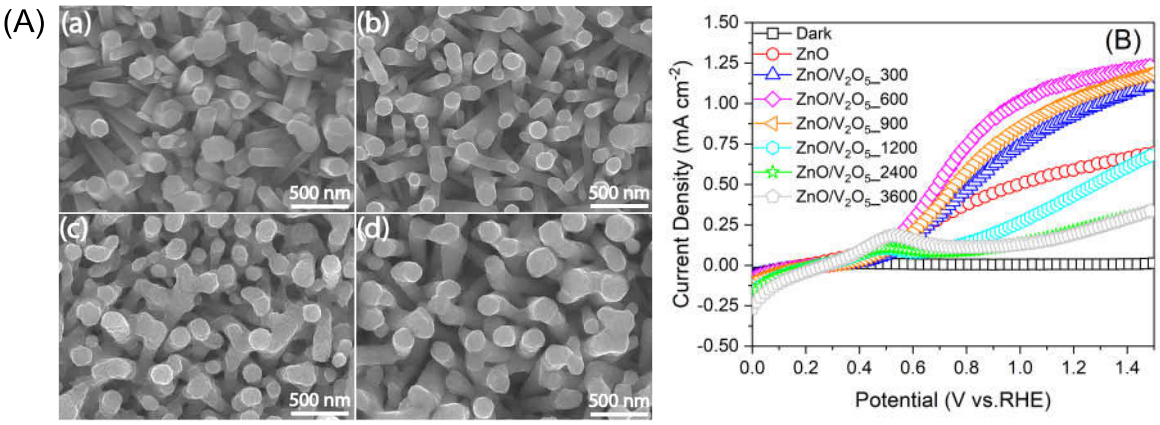

Figure 1 (A) FE-SEM images of (a) ZnO NRs arrays, (b) ZnO/V_2O_5-300, (c) ZnO/V_2O_5-900 and (d) ZnO/V_2O_5-2400 and; (B) J–V curves at a scan rate of 0.1 V s^{-1} recorded on the ZnO/V_2O_5-based photoanodes under simulated light illumination at 100 mW/cm^2 with a three-electrode system.