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Materials Research Society-Taiwan

Invited speaker's information form of IUMRS-ICA2017

Presentation on Symposium of "smart materials (D7)"

Presentationtitle:Smart Nanogenerator and Active SensorMade from Eco-friendly Materials

Speaker's name and affiliation: Jyh Ming Wu, National Tsing Hua University, Department of Materials Science and Engineering

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Brief biography of Speaker:

Jyh Ming Wu is currently an Professor and Vice chairman in the department of materials science and engineering at National Tsing Hua University (NTHU), Taiwan. He received his Ph.D degree from the department of materials science and engineering at National Tsing Hua University in 2005. From 2006-2013, he was an associate professor in the department of materials science and engineering at Feng-Chia University, Taiwan. After Aug 2013, he joined NTHU as an associate professor. Because of his contribution in nanoscience and nanotechnology, he has received numerous honors awards, included: 2011 Ta-You Wu Memorial Award by the National Science Council in Taiwan, Youth Leadership Award by Taiwan Vacuum Society, and 2017 Y. Z. Hsu Science Paper Award etc. He is actively participating in the activities and services in scientific professional societies and currently serves as a deputy general secretary of Materials Research Society in Taiwan. He is also the Editor and Guest Editor in Taiwan Vacuum Society, Journal of Nanomaterials(SCI), and Journal of Materials. He has published his works in numerous prestigious journals, such as Advanced Materials, ACS Nano, Nano Energy, Nanoscale, ACS Applied Materials and Interface, Journal of Physical and Chemistry C, Journal of Physical and Chemistry Letters, Journal of Materials Chemistry, Dalton Transitions, Nanotechnology, Journal of Electrochemical Society etc. His academic interests are in the areas of the optoelectronic nanodevices, nanosensors, piezo-catalytic materials, piezoelectric and triboelectric materials in energy harvesting research fields. These materials have also highly potential applications in human-electronics interface, nanogeneratoor, active sensors, strain sensor, and catalysis fields.

Abstract:

The rapidly expanding personal electronics in communication, wearable electronics, medical devices, environmental monitoring have dramatically increasing in the past decade. The number of batteries in the waste stream increase with increasing the number of portable electronics used. It is very critical task to search a better solution to reduce the electronic waste especially on the dispose of batteries. Researchers are now working to find alternative energy such as solar cell, biofuels, thermoelectricity, and nanogenerators to provide the electricity for personal electronics. This work, we are the first to discover a high short-circuit current density of triboelectric nanogenerator using recycling rice husks as a source material. On the basis of our FTIR spectra, the nanoporous RH_{SiO2} fragments offers highly dense Si-O-Si, Si-OH, and OH stretching bonds compare to commercial SiO2 nanoparticles. The RH_{SiO2} film therefore exhibits strongly tendency to repel the electron because the H atoms have an extremely low electron affinity compared to the PTFE film. The highly positively charged surfaces of the nanoporous RH_{SiO2} film is five times higher than that of commercially non-porous SiO2 film based on our theoretical calculated results. Interestingly, the porous RH_{SiO2} film can offer a rapidly charging and discharging process due to its wide range of pore size distribution, leading to the peak short-circuit (Isc) current density of 5.7 mAm^{-2} was measured from the RH_{SiO2} triboelectric nanogenerator (RH_{SiO2} TENG). In addition, the lead-free piezoelectric materials made from TeO_2, $ZnSnO_3$, and ZnS nanowires in the applications of self-powered active sensor will be reported.

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