Preface for Special Topic: Nanogenerators
Jung Ho Kim, Sang-Woo Kim, and Zhong Lin Wang

Citation: APL Materials 5, 073701 (2017); doi: 10.1063/1.4993242
View online: https://doi.org/10.1063/1.4993242
View Table of Contents: http://aip.scitation.org/toc/apm/5/7
Published by the American Institute of Physics

Articles you may be interested in
Nanogenerators: An emerging technology towards nanoenergy
APL Materials 5, 074103 (2017); 10.1063/1.4977208

Research Update: Materials design of implantable nanogenerators for biomechanical energy harvesting
APL Materials 5, 073801 (2017); 10.1063/1.4978936

Research Update: Recent progress in the development of effective dielectrics for high-output triboelectric nanogenerator
APL Materials 5, 073802 (2017); 10.1063/1.4979306

Research Update: Nanogenerators for self-powered autonomous wireless sensors
APL Materials 5, 073803 (2017); 10.1063/1.4979954

Research Update: Hybrid energy devices combining nanogenerators and energy storage systems for self-charging capability
APL Materials 5, 073804 (2017); 10.1063/1.4979718

A nanowire based triboelectric nanogenerator for harvesting water wave energy and its applications
APL Materials 5, 074104 (2017); 10.1063/1.4977216
Preface for Special Topic: Nanogenerators

Jung Ho Kim,1,a Sang-Woo Kim,2,a and Zhong Lin Wang3,a

1Institute for Superconducting and Electronic Materials (ISEM), Australian Institute for Innovative Materials (AIIM), University of Wollongong, North Wollongong, NSW 2500, Australia
2School of Advanced Materials Science and Engineering, Sungkyunkwan University (SKKU), Suwon 440-746, South Korea
3School of Materials Science and Engineering, Georgia Institute of Technology, Atlanta, Georgia 30332, USA and Beijing Institute of Nanoenergy and Nanosystems, National Center for Nanoscience and Technology (NCNST), Chinese Academy of Sciences, Beijing 100083, People’s Republic of China

(Received 28 June 2017; accepted 4 July 2017; published online 14 July 2017)

Nanogenerators were first invented by Zhong Lin Wang at the Georgia Institute of Technology in 2006, based on the piezoelectric effect, with the aim of converting wasted small-scale mechanical energy into electricity. Later, the field of nanogenerators has been expanded to include the triboelectric effect and the pyroelectric effect. Considering the recent growth of the internet of things (IoTs), a variety of electronic devices, such as sensors, actuators, and wireless transmitters/receivers, have been developed, which only consume power on the microwatt (µW)–milliwatt (mW) scale with high sustainability. Unlike previous battery power supplies, nanogenerators are an effective way to power these electronic devices and realize self-powering systems using the energy provided by the working environment.

During the past 10 yr, many researchers have developed various types of nanogenerators adapted for various applications, with many advantages such as high power output, flexibility, compactness (“all-in-one” design), lightweight, cost-effective operation, and even excellent interfaces with a wide range of storage devices. These systems are ultimately targeting sustainable power source solutions in the microwatt (µW) to even gigawatt (GW) range. Their potential applications include smart/wearable/portable electronics, the internet of things (IoT), biomedical devices, sensor networks, and smart-grid systems.

Building on this background, this special issue of APL materials is devoted to research perspectives and reports on recent advances in the development of various nanogenerators, including representative piezoelectric, triboelectric, and thermoelectric devices, as well as their advanced material characterizations and various modes and mechanisms of device operation. We also suggest more practical guidelines to further develop these research concepts into manufacturing technologies. We hope that innovative nanogenerators with superior energy harvesting efficiency can be applied as practical energy devices in the future.

[a] Authors to whom correspondence should be addressed: jhk@uow.edu.au; kimsw1@skku.edu; and zhong.wang@mse.gatech.edu

2166-532X/2017/5(7)/073701/1 5, 073701-1 © Author(s) 2017