Washington University in St. Louis

SCHOOL OF ENGINEERING & APPLIED SCIENCE

Preston M. Green Department of Electrical & Systems Engineering

Seminar Announcement

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Green Hall, Room 0120
1:00 P.M.

Capturing Energy through Triboelectric Nanogenerators: An Emerging Power Solution

Abstract: As the development of the Internet of Things (IoT), trillions of widely-distributed devices are integrated for health monitoring, biomedical sensing, environmental protection, infrastructure monitoring, and security. The traditional technology for powering these devices is using batteries, which might not be an optimal solution due to the limited lifetime, difficulties for replacement and maintenance, and potential environmental issues. To provide a sustainable power solution, triboelectric nanogenerator (TENG) has been developed since 2012 for high-efficiency mechanical energy harvesting from ambient environment. Starting from the fundamental studies of TENG operation cycles through the voltage-charge plots, a series of important research have been conducted, including: (1) maximizing energy output and establishing figure-of-merits as standards for quantitative evaluation of TENG; (2) triggering electrospray ionization process towards unprecedented controls and ultra-sensitivity in mass spectrometry analysis; (3) developing effective energy storage solution through the designed charging cycles of TENG. These studies will drive the further development of TENG technology for broad applications and industrializations, towards high-efficiency self-powered systems.

Bio: Dr. Yunlong Zi is a Postdoctoral Fellow in the School of Materials Science and Engineering at Georgia Institute of Technology, under supervision of Prof. Zhong Lin Wang. Dr. Zi received his Ph.D. in Physics from Purdue University in 2014; his Bachelor of Engineering in Materials Science and Engineering from Tsinghua University in 2009. His current research interests focus on high-efficiency mechanical energy harvesting through triboelectric nanogenerators (TENG), TENG triggered high-voltage applications, and self-powered systems. He pioneered utilizing the voltage-charge plots to analyze and optimize energy output cycles of TENG. An ultimate goal of Dr. Zi's research is the development of energy-efficient self-powered systems for sustainable operation of devices. Dr. Zi also developed methodology and mechanisms of in-plane growth, self-catalyzed growth, and in-situ doping method for group III-V semiconductor nanowire arrays. As the 1st author, his research have been published in top-notch journals, including *Nature Nanotechnology*, *Nature Communications*, *Advanced Materials*, *Nano Letters*, *ACS Nano*, *Nano Energy*, and *etc*. He was honored as the winner of MRS Postdoctoral Award by Materials Research Society in 2017, as the first recipient from Georgia Tech; and one of "5 students who are transformation makers" by Purdue University in 2013, as highlighted in Purdue homepage.

Host: R. Martin Arthur