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Topic of the Speech:
Synthesis and Large-Scale Assembly of Piezoelectric Biomaterials and Devices

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Professor Xudong Wang is the Grainger Institute for Engineering Professor in the department of Materials Science and Engineering at University of Wisconsin – Madison, and the Energy & Sustainability thrust Leader at the Grainger Institute for Engineering. Dr. Wang received his PhD degree in Materials Science and Engineering from Georgia Tech in 2005.

His current research interests include developing advanced nanomaterials and nanodevices for mechanical energy harvesting from human activities for biomedical applications; and understanding the coupling effect between piezoelectric polarization and semiconductor functionalities.

He has won number of prestigious national and international awards, including PECASE, NSF CAREER Award, DARPA Young Faculty Award, etc. He has published more than 170 papers on peer-reviewed journals, including Science, Nature, Nature Energy, etc. His current h-index is 75.

ABSTRACT SUBMISSION
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Synthesis and Large-Scale Assembly of Piezoelectric Biomaterials and Devices

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ABSTRACT (NO MORE THAN 500 WORDS:)

Piezoelectric materials are a group of important functional building blocks that interfacing the human body by coupling biomechanical energy and electricity. So far, many technology innovations have advanced piezoelectric materials and composites toward a broad range of biomedical applications, which possess unique biocompatibility and flexibility. Fundamentally, materials design and engineering draw the boundary where this technology may advance. In this talk, I introduce our most recent development of piezoelectric materials and composites that are particularly designed for implantable nanogenerator applications. First, I present our wafer-scale approach to creating piezoelectric biomaterial thin films based on γ glycine crystals. The self-assembled sandwich film structure enabled both strong piezoelectricity and largely improved flexibility. We will further discuss strategies of controlling the orientation and morphology of amino acid crystals to improve the piezoelectricity. Then, new ferroelectric composites are presented as a new composite used in electrospinning for directly manufacturing of piezoelectric nanofibers with enhanced polarization aligned and piezoelectricity. At last, composite for direct 3D printing will be introduced of manufacturing of piezoelectric architectures with tunable piezoelectric and mechanical properties. This group of materials enable new capability of in vivo charging and electrostimulations, which revolutionaries the design and implementation of many biomedical therapeutics.