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SMART TEXTILES TOWARDS SUSTAINABLE AND PERVASIVE ENERGY FUTURE

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Energy crises and global warming severely limit the ability of human civilization to develop along a sustainable pathway. Increasing renewable energy sources and decreasing energy consumption are fundamental steps to achieve sustainability. By using remotely deployed sensors, the Internet of Things (IoT) has already changed our daily life in fundamental and meaningful ways. In the meanwhile, it is also forcing the world to use a new form of energy to sustainably power billions of distributed devices/sensors. The required energy source needs to be pervasive, mobile and beyond the capability of the traditional centralized, ordered power supplying systems. Batteries may not be the best solution for the IoT, owing to their limited lifetime, size, and environmental concerns. Powering the IoT would be impossible without making the sensors self-powered by harvesting energy from the working environment to ensure the long-term operation.

In this talk, I will introduce our research that contributed to the sustainable energy future via three fundamental approaches. (1) Energy harvesting from the ambient environment, especially I will present a hybrid power textile, which was constructed via large-scale weaving technique for simultaneously harvesting energy from ambient solar radiance and human body motion. (2) Energy saving via developing a variety of self-powered/low-power sensors. (3) Energy saving via promoting the energy efficiency. Especially, I developed a nanophotonic structure textile with tailored mid-infrared property for passive radiative human body cooling to improve the building energy efficiency. The nanoporous polyethylene fabric could lower human skin temperature by 2.3^{o}C compared with the commercial cotton fabric of same thickness, contributing to a greater than 20% saving on indoor cooling energy.

Jun Chen is currently an assistant professor in the Department of Bioengineering, University of California, Los Angeles. He received his Ph.D. in Materials Science and Engineering from the Georgia Institute of Technology in 2016 under the supervision of Prof. Zhong Lin Wang. From 2016 to 2019, he was a postdoctoral research fellow with Prof. Yi Cui in the Department of Materials Science and Engineering at Stanford University. His current research focuses on nanotechnology and bioelectronics for energy, sensing, environment and therapy applications in the form of smart textiles, wearables, and body area sensor networks. He has already published 2 books, 100 journal articles and 58 of them are as first/corresponding authors in *Nat. Energy*, *Nat. Sustain.*, *Nat. Commun.*, *Chem. Rev.*, *Joule*, *Matter*, and many others. He also filed 10 US patents and licensed 1. He is currently an Associate Editor of *Biosensors and Bioelectronics*, and an Editorial Board Member of *Nano-Micro Letters*, *Frontiers in Pharmacology*, *Frontiers in Chemistry*, and *Smart Materials in Medicine*. With an h-index of 57, he was identified to be one of the world's most influential researchers in the field of Materials Science by the Web of Science Group, and on the global list of The Highly Cited Researchers 2019.

LIGHT REFRESHMENTS WILL BE PROVIDED.