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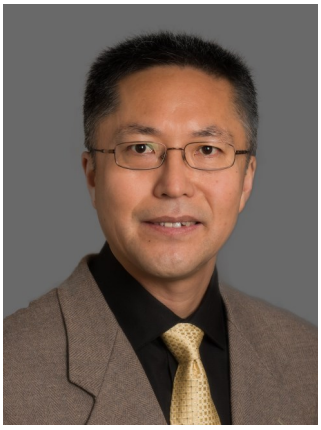

Topic of the Speech:

Can Photoelectric Conversion Efficiency of Solar Cells Be Doubled?

Professor Bingqing Wei

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Professor Bingqing Wei received his Bachelor's degree (1987), M.S (1989), and Ph.D. (1992) in Mechanical Engineering from Tsinghua University, Beijing, China. He is currently a Tenured Professor in the Department of Mechanical Engineering at the University of Delaware, USA. Dr. Wei was an Assistant Professor in the Department of Electrical & Computer Engineering and Center for Computation & Technology at Louisiana State University from 2003 to 2007. He was a Research Scientist at Rensselaer Polytechnic Institute, Department of Materials Science and Engineering and Rensselaer Nanotechnology Center from 2000 to 2003. Dr. Wei was a visiting scientist at Max-Planck-Institut für Metallforschung, Stuttgart, Germany in 1998 and 1999. From 1992 to 2001, he was a faculty member at Tsinghua University in Beijing.

Dr. Bingqing Wei's research interest and expertise lie in nanomaterials and nanotechnology. His research interests have been focusing on the synthesis, processing, characterization, and physical properties of carbon nanostructures, carbon nanotube nanocomposites, and applications of carbon nanostructures in energy conversion and storage devices. His scholarly achievements in the field of nanomaterials and nanotechnology are adequately reflected by his 373 papers published in refereed international journals, including Nature and Science, 122 scientific conference presentations and 225 invited talks and seminars in academia and industry worldwide. His research work has been cited more than 32800 times by peer scientists with an h-index of 93 (Web of Science) (more than 42000 times with an h-index of 101 on Google Scholar). Dr. Wei is among Highly Cited Researchers from Clarivate for his research on nanomaterials that enable energy conversion and storage.

ABSTRACT SUBMISSION
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Can Photoelectric Conversion Efficiency of Solar Cells Be Doubled?

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ABSTRACT (NO MORE THAN 500 WORDS:)

Solar cells play a pivotal role in addressing some of the most pressing challenges facing our planet today. As a clean and renewable energy source, solar cells contribute significantly to reducing our dependence on fossil fuels, mitigating climate change, and curbing environmental degradation. Harnessing the power of sunlight, solar cells convert sunlight into electricity, offering a sustainable and environmentally friendly alternative to conventional energy sources. The widespread adoption of solar technology promises to achieve energy independence for nations, reduce greenhouse gas emissions, and promote a more sustainable and resilient energy infrastructure. Additionally, solar power can potentially empower communities in remote or off-grid areas, providing access to electricity where traditional power sources may be impractical or unavailable. The importance of solar cells lies not only in their capacity to generate clean energy but also in their role as catalysts for a more sustainable and equitable future.

Enhancing the photoelectric conversion efficiency (PCE) of solar cells is a constant and essential endeavor to advance the utilization of renewable electricity and build sustainable technology and society. However, the primary factor hindering PCE is the energy loss in the form of heat dissipation, imposing a PCE limitation of < 33% and a practical record high PCE of 26.8% for single-junction Si solar cells, the most popular solar conversion technology thus far. How to further improve the PCE to the next level is a fundamental and practical challenge. In this talk, I will discuss the possibilities of strengthening the PCE of solar cells to nearly double the limitation from temperature regulation, light penetration, and carriers' density and mobility perspectives.