

Prof. Kai Zhu

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 Golden, Colorado**

***Material Synthesis, Device Operation, and Charge-Carrier
 Dynamics of Perovskite Solar Cells***



Organometallic halide perovskites (e.g., $\text{CH}_3\text{NH}_3\text{PbI}_3$ and $\text{CH}_3\text{NH}_3\text{PbI}_{3-x}\text{Cl}_x$) have recently emerged as a new class of light absorbers that have demonstrated a rapid progress and impressive efficiencies (>15%) for solar conversion applications. These absorbers have strong light absorption properties compared to other traditional thin film light absorbers and can be produced by a low cost solution approach.

Despite the rapid progress demonstrated by these light absorbers, there is a lack of understanding of some fundamental physical and chemical properties of these materials. In this presentation, I will first give a general overview of recent development of material synthesis, device development, and basic characterization of perovskite solar cells. I will then discuss on some of our recent investigations on the structure, charge transport, recombination, and device characteristics of perovskite $\text{CH}_3\text{NH}_3\text{PbI}_3$ solar cells. Charge transport and recombination properties were studied by frequency-resolved modulated photocurrent/photovoltage and impedance spectroscopies. The impact of device composition and fabrication conditions on the solar cell characteristics will be discussed.

Dr. Kai Zhu received his BS (1995) and MS (1998) degrees from the University of Science and Technology of China, and a PhD degree in physics from Syracuse University in 2003. He joined National Renewable Energy Laboratory (NREL) in 2004 as a postdoc researcher. He is currently a Senior Scientist in the Chemical and Materials Science Center at the National Renewable Energy Laboratory. His research interests have included characterization and modeling of hydrogenated amorphous silicon thin film solar cell, III-V wide-bandgap light emitting diodes, dye-sensitized solar cells, and Li-ion batteries and supercapacitors. His current research focuses on perovskite solar cells, including material development, device fabrication, and fundamental characterization on charge-carrier dynamics and device operating principles.

**Wednesday, November 12, 4:00 pm
 Room 136 Jorgensen Hall**

3:45 pm—Refreshments served in Jorgensen Atrium area

**Host:
 Dr. Jinsong Huang
 Department of
 Mechanical &
 Materials Eng**

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