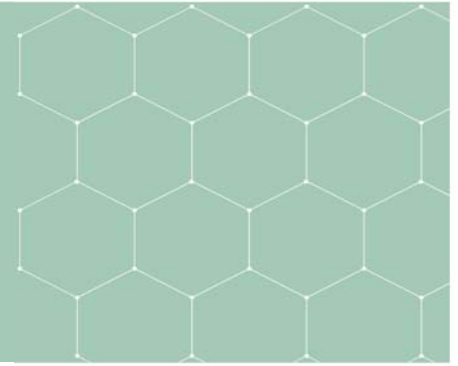




# PHYSICS

## COLORADO STATE UNIVERSITY



### **CSU PHYSICS COLLOQUIUM**

**How Metal Halide Perovskite Semiconductors could Transform the Solar Industry**

**Michael McGehee, U. C.- Boulder,**

**Chemical and Biological Engineering Department**

March 11th at 4 p.m.

120 Engineering (Hammond Auditorium)

#### **Abstract**

In the last six years the power conversion efficiency of solar cells made with metal halide perovskite semiconductors has soared from less than 7% to over 23%. Only four other families of semiconductors have ever reached this efficiency. Perovskites are very attractive compared to those families because they can be deposited from solution at low cost, function well even when they contain a high density of defects, and have the right bandgaps to be used in tandem solar cells. In tandems one semiconductor harvests the photons in the solar spectrum that have higher energy and generates a large voltage while another semiconductor harvests the photons with lower energy. Using this strategy makes it possible to improve the efficiency by approximately 50%. In this seminar I will discuss several strategies we have used to tune the band gap, an unusual reversible light-induced phase separation we discovered, the numerous implications of having of mobile halogen vacancies, our progress in making tandem solar cells with > 25 % efficiency and several strategies for making the solar cells stable. A pathway to stable low-cost 30 % efficient solar cells will be presented.



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### **Bio:**

Mike McGehee is a Professor in the Chemical and Biological Engineering Department at the University of Colorado Boulder. He is also a Fellow of the Materials Science and has a joint appointment at the National Renewable Energy Lab. He was a professor in the Materials Science and Engineering Department at Stanford University for 18 years and a Senior Fellow of the Precourt Institute for Energy. His current research interests are developing new materials for smart windows and solar cells. He has previously done research on polymer lasers, light-emitting diodes and transistors as well as transparent electrodes made from carbon nanotubes and silver nanowires. His group makes materials and devices, performs a wide variety of characterization techniques, models devices and assesses long-term stability. He received his undergraduate degree in physics from Princeton University and his PhD degree in Materials Science from the University of California at Santa Barbara.