



# RASEI

RENEWABLE AND SUSTAINABLE ENERGY INSTITUTE

## **BIG** energy seminar series

Addressing global energy challenges in scale and complexity.



### *Stable perovskite-silicon tandem solar cells with greater than 23% efficiency and a direction for smart windows*

**Professor Michael McGehee**  
Stanford University

**Date:** August 29, 2016 3:00pm – 4:00pm

**Location:** SEEC C120 - 4001 Discovery Drive, Boulder CO, 80303

**\*Please note – this is a multi-part seminar\***

#### **Abstract:**

I. Perovskite semiconductors are very attractive for the high bandgap solar cell in tandems because it is possible to have an open circuit voltage greater than 1.2 V. We have demonstrated a monolithic perovskite on silicon tandem with 23.7% power conversion efficiency and have passed the industry standard 1000 hour 85°C-85% humidity damp heat test. The design of these cells and progress towards understanding light-induced phase separation in some perovskite compounds will be discussed.

II. It would be highly beneficial to be able to control the transmission of light through windows, skylights and glasses with an electrical signal. Unfortunately, electrochromic windows based on either metal oxides or semiconducting polymers are not yet good enough for these applications due to a combination of being too expensive, not being switchable throughout the entire visible spectrum, and not being sufficiently durable. We are developing a different approach to making smart windows that involves electrochemically depositing and stripping thin films of metal with nanometer thickness control. Our prototype windows already have superb contrast between the on and off state (3-90 %), uniform transmission throughout the visible and well into the infrared, attractive switching times and superb durability.

#### **Biography:**

Michael D. McGehee is a Professor in the Materials Science and Engineering Department at Stanford University and a Senior Fellow of the Precourt Institute for Energy. His research interests are developing new materials for smart windows and solar cells. He has taught courses on nanotechnology, nanocharacterization, organic semiconductors, polymer science and solar cells. 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, where he did research on polymer lasers in the lab of Nobel Laureate Alan Heeger. He won the 2007 Materials Research Society Outstanding Young Investigator Award. He is a technical advisor to Next Energy, PLANT PV, and Sinovia and his former students have started more than ten companies.

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