Chemistry and Biochemistry

Spring 2022 seminar

Please join us for the following seminar!

Perovskite solar cells: from chemistry to manufacturing

SwiftSolar

Speaker:

Rohit Prasanna

Senior Scientist

When:

Friday, April 8th
1:00 pm

Where:

GLNN 314

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Organic-inorganic metal halide perovskite materials are the newest class of semiconductors to have reached high efficiencies in solar cells. They are outstandingly tolerant to bulk and surface defects, and as a result, routinely reach over 20% efficiency in sunlight-to-electricity conversion despite being fabricated at low temperatures and high throughput as polycrystalline thin films (with plenty of defects and grain boundaries). By simple compositional substitution, they can also be tuned over a wide range of band gaps, from 1.2 eV to over 3 eV. As a result, they show great promise for making tandem solar cells, which reach higher efficiencies than conventional single-junction solar cells are physically capable of.

Perovskite solar cells have made rapid progress in academic research over the past decade. Perovskite-silicon tandem solar cells have surpassed the record efficiency of silicon, which is the dominant solar cell technology deployed worldwide today. In parallel, progress is continually being made around their long term stability under heat, light, and atmospheric exposure, although a long road ahead remains to match the decades-long stability that conventional silicon solar cells routinely exhibit.

In this talk, I will discuss the chemistry that sets the band gap of metal halide perovskites, which leads to simple methods to tune it to be optimal for various devices such as tandem solar cells and light emitting diodes. I will discuss studies of the reaction between tin-lead perovskites and oxygen, which is a leading cause of their degradation. With the very fast academic progress that has advanced the efficiency and stability of perovskite solar cells in the past decade, there are now many efforts toward commercializing these devices, and I will discuss some of the challenges associated with scaling up the production of this exciting class of thin film solar cells.