

CONDENSED MATTER SEMINAR

ADITYA MOHITE

SCIENTIST, MATERIALS PHYSICS & APPLICATIONS
LOS ALAMOS NATIONAL LABORATORY

The emergence of layered 2D perovskites for stable and high efficiency optoelectronic devices

Hybrid (inorganic-organic) perovskites have demonstrated an extraordinary potential for clean sustainable energy technologies and low-cost optoelectronic devices such as solar cells, light emitting diodes, detectors, sensors, ionic conductors etc. In spite of the unprecedented progress in the past six years, one of the key challenges that exists in the field today is the large degree of processing dependent variability in the structural and physical properties. This has limited the access to the intrinsic properties of hybrid perovskites and led to multiple interpretations of experimental data. In addition to this, the stability and reliability of devices has also been strongly affected and remains an open question, which might determine the fate of this remarkable material despite excellent properties.

In this talk, I will describe our recent work on Ruddlesden-Popper halide perovskites as a potential alternative to the bulk hybrid perovskites. I will describe the versatility of this novel system through our efforts on achieving photovoltaic devices, photodetectors and light emitting diodes with technologically relevant stability. At the heart of these high performance devices lies an unusual photo-physical behavior where, counterintuitive to classical quantum-confined systems, there exists an internal mechanism for the dissociation of excitons to edges of the perovskite layers. These states provide a direct pathway for dissociating excitons into longer-lived free-carriers, which remain well protected from non-radiative processes.

Tuesday, October 31, 2017

4:00 pm

Room 334 JFB