SAN DIEGO STATE UNIVERSITY

Mechanical Engineering
Fall Seminar Series

# Next Generation Solar Cells: An Integrated Approach of Device Efficiency & Lifetime

## Tuesday, October 30th, 2:00–3:00 pm; Dean's Conf. Rm. E-203E

**Abstract:** With > 120 TW of solar power irradiating the earth, photovoltaics offers the promise of an essentially limitless energy supply, requiring the cost (per Watt) to be made competitive with traditional carbon-based sources. High conversion efficiency and long device lifetimes requires integrated approach of materials theory, modeling, synthesis, characterization, test and validation to understand and predict materials evolution. In the field of energy conversion technology, the confluence of state-of-the-art characterization approaches and advanced computing will enable us to design next generation materials and devices beyond Shockley Queisser limits. Thin-film solar cell technologies have shown record power conversion efficiencies > 22% for material technologies such as cadmium telluride (CdTe), copper indium gallium, diselenide (CIGS) and organic-inorganic hybrid perovskites. Group V dopants in CdTe, bandgap engineering in CIGS and perovskite tandems provide pathways approaching Shockley-Queisser limits and beyond. However, many fundamental questions on degradation mechanisms of these high efficiency devices remain unanswered, particularly, wide bandgap halide perovskites. This presentation will cover recent results in inorganic halide perovskites and CIGS solar cells towards developing an integrated theoretical and experimental framework for stable high efficiency next generation solar cells. Pathways for high efficiency and stable CdTe solar cells will also be discussed.

**Dr. Shubhra Bansal**

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**BIO:** Professor Bansal received her PhD in Materials Science and Engineering from Georgia Institute of Technology in 2006. She joined UNLV as an Assistant Professor in Mechanical Engineering in 2015. Prior to this, she held senior scientist positions at Department of Energy (2011-2014) and GE Global Research (2007-2011). Her prior research focus includes materials development for CdTe thin-film solar cells, high and low frequency MEMS microswitch, CZT ultrasound transducers, etc. She has published over 25 research articles and 9 international patents. Her research interest is to develop materials and predictive lifetime methodology for energy and sensor applications. She currently serves as a reviewer for DOE, NSF and active committee member for MRS and IEEE.

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