

# MRSEC SEMINAR SERIES

## High Performance Lanthanide Thermoelectric Materials for Space Applications

For more than 50 years, radioisotope thermoelectric generators (RTGs) have been used successfully to power U.S. space missions, including NASA's deep space probes such as Voyagers 1 and 2, Cassini to Saturn, and the recently landed Curiosity Mars rover. The state-of-the-art thermoelectric materials for space have typically been based up on either SiGe alloys or PbTe. Although reliable/robust, the performance of these systems remains fairly low. In recent years, complex materials such as n-type  $\text{La}_{3-x}\text{Te}_4$  and p-type  $\text{Yb}_{14}\text{MnSb}_{11}$  have emerged as new high efficiency, high temperature thermoelectric materials. The high performance of these materials is attributed to their favorable electronic and thermal characteristics such as: semi-metallic behavior due to small band gaps, low glass-like lattice thermal conductivity values due to structural complexity and reasonably large thermopower values near their peak operating temperatures. We will present an overview of recent research efforts at JPL and collaborating institutions on these material systems and will discuss approaches and preliminary results on improving the efficiency of these materials through a combination of first principle electronic structure simulations and empirical experimental research.



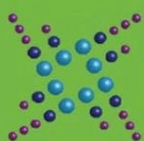
**Sabah Bux, Ph.D.**

**Senior Member of Technical Staff  
Thermal Energy Conversion Technologies Group  
Jet Propulsion Laboratory**

*California Institute of Technology*

**Tuesday, October 24th, 2017  
Cook Hall, Room 2058**

1:30 p.m. - 2:30 p.m.



Northwestern University Materials Research Center  
mrc@northwestern.edu - 847.491.3606

