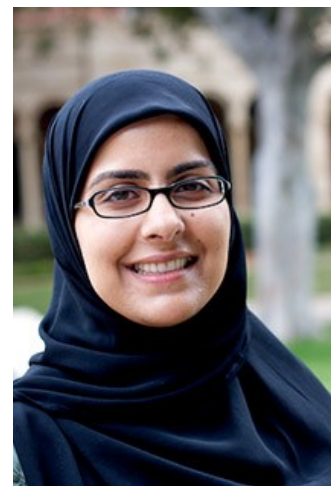




**The Department of
Mechanical Engineering**
PRESENTS

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Friday, February 23, 2018
WCH Room 205/206
11:10-12:00PM

High Efficiency Lanthanide Thermoelectric Materials for Space Applications

Abstract:

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.

About the Speaker:

Sabah Bux received her Bachelors of Science in Chemistry, Magna Cum Laude from California State Polytechnic University Pomona in 2005 and received her Ph.D. in inorganic chemistry from UCLA in 2010. Currently she is a techonologist at the Jet Propulsion Laboratory working in the thermal energy conversion research and advancement group (3464) where she is the lead researcher and task manager in the development of high performance advanced thermoelectric materials for space applications. Her main research focus is the investigation of new materials and synthesis of them using novel synthetic techniques/processes. She holds several patents and publications on the synthesis and characterization of materials such as nanostructured $\text{Si}_{1-x}\text{Ge}_x$ alloys, Mg_2Si , and silicon-based composites, III-V semiconductors, metal-matrix composites and complex Zintl phases. She received the 2015 International Thermoelectrics Society Young Investigator award and is the 2017 recipient of the JPL Lew Allen early career award for excellence in research and technology.