



6th TcSUH STUDENT/POSTDOC SEMINAR

August 19, 2019 - 5:00 pm, HSC 102

Food and soft drinks will be served!!

High thermoelectric cooling performance of n-type Mg₃Bi₂-based materials

Dr. Jun Mao

TcSUH and Department of Physics

Abstract: Thermoelectric materials have a large Peltier effect, making them attractive materials for solid-state cooling applications. Bi₂Te₃-based alloys have remained as the state-of-the-art room temperature materials for many decades. However, cost partially limited wider use of thermoelectric cooling devices because of the large amounts of expensive tellurium. We report n-type Mg₃Bi₂-based materials with a peak ZT of ~ 0.9 at 350 K, which is comparable to the commercial Bi₂Te_{3-x}Se_x, but much cheaper. Cooling device that made of our material and p-type Bi_{0.5}Sb_{1.5}Te₃ has produced a large temperature difference of ~ 91 K at the hot-side temperature of 350 K. The n-type Mg₃Bi₂-based materials are promising for thermoelectric cooling applications.

Bio: Dr. Jun Mao is currently postdoc in Dr. Zhifeng Ren's group in the department of Physics and Texas Center for Superconductivity at University of Houston.

A Study of Unusual Fines in the Lunar Soil

Monica Martinez

TcSUH and Department of Mechanical Engineering

Abstract: Lunar regolith is the product of meteorite impact on both the lunar mare and highlands. Micrometeorites continually impact the lunar surface, melt it, and overturn its contents – a process called impact gardening. Additionally, solar wind and cosmic rays impact the surface materials. Precursor rocks derive the mineral content of the regolith, and agglutinate glasses dominantly consist of material derived from the minerals. Examination of the regolith fines reveals the presence of various phases that did not originate within the precursor materials and potentially provides insight into the regolith gardening process. Fine-grained regolith collected by Apollo 17, from which glass spherules were removed, was sprinkled on mylar in a layer as near to one grain thick as possible. X-ray mapping was employed in a JEOL JSM-6330F SEM with an EDAX Octane Pro EDS and TEAM software.

Non-igneous species were observed throughout the characterization of the regolith. These species consist of calcium-rich sulfides, chlorides of inter-soluble potassium and sodium, native antimony, and calcium and titanium oxides. The nature of these species can be attributed to the temperatures reached upon impact of micrometeorites. These temperatures are high enough to achieve the volatilization of these elements, resulting in their eventual reaction and grain crystallization.

Bio: Ms. Monica Martinez is currently an undergraduate student in Dr. James K. Meen's group in the department of Mechanical Engineering and Texas Center for Superconductivity at University of Houston.

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Persons with disabilities who require accommodations to attend this seminar should call 713-743-8213.