

# SEMINAR NOTICE

*Department of Physics and Engineering Physics  
University of Saskatchewan*

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**SPEAKER:** Jianbao Zhao, PhD Candidate,  
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**TOPIC:** *Study of  $Mg_2Si$ -based Thermoelectric Materials*

**DATE:** Tuesday, October 20th, 2015

**TIME:** 3:30-4:30pm.

**PLACE:** Rm. 103, Physics Building

## **ABSTRACT:**

Due to increasing global energy concerns, alternative sustainable methods to create energy such as thermoelectric energy conversion have become increasingly important. Originally, research into thermoelectric materials was focused on tellurides of bismuth and lead because of the exemplary thermoelectric properties of  $Bi_2Te_3$  and  $PbTe$ . These materials, however, contain toxic lead and tellurium, which is also scarce and thus expensive. A viable alternative material may exist in  $Mg_2Si$ , which needs to be doped and alloyed in order to achieve reasonable thermoelectric efficiency. We investigated several doping models by theoretical calculations and experimental studies. In this presentation, I will introduce the projects I worked on in details during the last three years. The projects are Sb or Bi single doped  $Mg_2Si$ , Ge and Bi double-doped  $Mg_2Si$ , Sb Al Zn multi-doped  $Mg_2Si$ , pressure effect on Al-doped sample, and the effect of multi wall carbon nanotubes (CNT) on the thermoelectric properties of  $Mg_2Si_{0.877}Ge_{0.1}Bi_{0.023}$ , respectively. Enhanced thermoelectric and electrical transport properties of  $Mg_2Si$ -based thermoelectric materials have been achieved by the doping method. A maximum ZT of 0.964 was found for Sb0.5%Zn0.5% doped  $Mg_2Si$  at 880 K. This value is comparable to those of  $PbTe$  based thermoelectric materials.

Coffee and Cookies will be served in the Physics lounge at 3:00 pm. for those attending the seminar.