Department of **Materials Science & Engineering** seminar series 2019

Explore the nature of generation and migration of van der Waals Ge gaps in (GeTe)1-x(Bi2Te3)x thermoelectrics via in-situ TEM and dislocation theory

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Date: **14th Nov 2019, Thursday**
Time: **3:30 to 4:00 pm**
Venue: **EA-06-05**

Abstract

GeTe system thermoelectric material has drawn growing interests recently because of its ultrahigh ZT value of about 2.4 at 773K, which is among the best performance of thermoelectric family. Recent works reported that the ultrahigh ZT value can be achieved by inducing the van der Waals Ge gaps, which can effectively reduce the lattice thermal conductivity and electrical thermal conductivity by scatter phonons and trap charges. Although the structure of van der Waals Ge gaps has been studied by atomic-resolution HRTEM/HRSTEM, showing the missing layer of Ge atoms and migration of the adjacent Te atom layers, the mechanism of generation and migration of gaps remain unclear. In this paper, in-situ TEM is applied to directly observe the generation and migration of van der Waals gaps in (GeTe)1-x(Bi2Te3)x (x=0.05) thermoelectrical material. The dislocation theory is the first time to be employed to explain the generation and migration of van der Waals gaps, giving a new perspective to recognize the physical nature behind the emerging of van der Waals Ge gaps. This finding may help the material scientist to control the amount and distribution of van der Waals Ge gaps then enhance the thermoelectric performance.

Yu Yong received his bachelor's degree in metallurgical engineering and master's degree in material science and engineering from the University of Science and Technology Beijing. He is currently a Ph.D. candidate in the Department of MSE under the supervision of Prof. Stephen John Pennycook, focusing on the application of STEM and EELS on the study of energy-materials. His current research focuses on the application of advanced STEM techniques on thermoelectric material and catalytic material.

ALL ARE WELCOME!

Host: A/P Xue Junmin