Title: The Intercalation of Ionic Liquids, 1-Butyl-3-methylimidazolium Chloride, in Bismuth Telluride

Time: 14-Nov, Thursday 11:00~11:25 am.

Place: SERC 1014 (coffee and snacks will be provided)

Speaker: Haiyu (Hedy) Quan
PhD. Pre-Candidate

Abstract: Bismuth telluride (Bi$_2$Te$_3$) is one of the conventional thermoelectric materials. The bulk thermoelectric properties are highly dependent on the anisotropic crystal structure, i.e., a layered crystal structure with Van der Waal stacking. To enhance the thermoelectric performance, one effective strategy is to suppress phonons and simultaneously to improve electronic transport using a nanostructure. The ionic liquid, 1-butyl-3-methylimidazolium chloride or [Bmim][Cl], is used to intercalate and exfoliate Bi$_2$Te$_3$ to produce two-dimensional nanosheets, in which the thermoelectric properties are likely improved. X-ray diffraction (XRD) has been performed to characterize the crystal faces and the intercalated Van der Waals gaps are back calculated. By directly soaking Bi$_2$Te$_3$ powder in [Bmim][Cl] at a temperature of 120°C, it is indicated that [Bmim][Cl] could easily intercalate into the van der Waals gaps of Bi$_2$Te$_3$. The force-distance scans of atomic force microscopy (AFM) will be used to characterize the molecular interactions between ionic liquids and Bi$_2$Te$_3$ surfaces in order to further understand the exfoliation mechanism.

Biography: Haiyu Quan received the bachelor’s degree in polymer engineering from Donghua (Shanghai) University, China, in 2009; she earned the master’s degree in material processing engineering from Donghua University in 2012. She joined Dr. Wang’s group in 2012 fall, and is currently working toward a Ph.D. degree.