CSUN | CALIFORNIA STATE UNIVERSITY NORTHRIDGE

Interdisciplinary Research Institute for the Sciences (IRIS) Seminar

Friday, November 9, 2018
11:00am – 12:00pm
LO1326

Synthesis of Nitrogen-Doped Graphene on Metals from Azafullerene

Dr. Li Gao
Department of Physics and Astronomy
California State University, Northridge

Abstract:

Substitutional doping of graphene with heteroatoms is one of the most fascinating strategies for tailoring the properties of graphene and hence expanding the practical applications of this wonder material. In this talk, I will present our recent studies on the synthesis of nitrogen (N) doped graphene on metals by using the sole precursor azafullerene. The synthesis process, doping properties, and electronic properties are investigated by combining scanning tunneling microscopy (STM) and X-ray photoelectron spectroscopy (XPS) measurements. Three different metal substrates have been used, including the Ru(0001), Cu(111), and Ir(111) surfaces. For the synthesis on the Ru(0001) surface, we find that the concentration of N-related defects in the graphene layer can be tuned by adjusting the precursor dosage and the number of growth cycles. The spatial homogeneity of N-related defects is high and improves with increasing doping concentration. The predominant doping configuration is pyridinic N that is correlated to single-atom vacancies in the graphene layer. For the synthesis on the Cu(111) surface, almost all N dopants within graphene islands are in the form of graphitic N and they tend to arrange into curved lines, which can be attributed to an edge-guided doping process. Most N dopants are at the edges of graphene in the form of pyridinic N. The influence of N doping on local work function of graphene has also been investigated. Some preliminary results for the synthesis on the Ir(111) surface will also be discussed. Our studies suggest that azafullerene is an effective N-containing sole precursor for the controlled synthesis of N-doped graphene, and the growth substrates strongly affect the synthesis process and resultant doping properties.