Yale Institute for Nanoscience and Quantum Engineering

Friday-October 6, 2017

12:00-1:00 PM

BECTON SEMINAR ROOM
Light lunch will be served at 11:45 a.m.

Omur Erdinc Dagdeviren
Department of Mechanical Engineering and Materials Science, Yale University

"Structure and Electronic Properties of Epitaxial Topological Crystalline Insulator Films"

Revealing the local electronic properties of surfaces and their link to structural properties is an important problem for topological crystalline insulators (TCI) in which metallic surface states are protected by crystal symmetry. Here, we characterized the structure and electronic properties of TCI SnTe film surfaces grown by molecular beam epitaxy using scanning probe microscopy. The results reveal the influence of various defects on the electronic properties, including screw dislocations, point defects, and tilt boundaries that lead to dislocation arrays that serve as periodic nucleation sites for pit growth. These features manifest on multiple length scales, thereby inducing variations in the electronic structure of the surface. Mapped in scanning tunneling microscopy images as standing waves superimposed on atomic scale images, their exact appearance is shaped by the details of the surface topography such as surface steps and point defects. Since any symmetry-breaking defect affects the formation of topological states, we propose that by patterning the surface with the scanning probe tip, custom electronic structures could be created that may enable the fabrication of topological devices.

Jaemin Kong
Department of Chemical and Environmental Engineering, Yale University

"Organic Solar Cells: More remarkable than you expected"

Organic solar cell was considered one top promising light-harvesting technology in academia before organo-lead halide perovskite solar cell appeared. After the emergence of organo-lead halide perovskite solar cell, most researchers in the field of organic solar cells were attracted to move to the new research field, and most territories of organic solar cells were taken over by the new technology. Nevertheless, why still researchers are foreseeing a bright future of organic solar cell is that it has complementary strengths which the perovskite solar cell is hard to take. In this talk, strengths and challenges of organic solar cell will be dealt with in comparison to other solar cell technologies, especially organolead halide perovskite solar cell to find new opportunities for the second round.

Host: Professor Corey O'Hern