Max-Planck-Institut für Struktur und Dynamik der Materie

Max Planck Institute for the Structure and Dynamics of Matter

Tuesday, 5 May 2015, 14:00

CFEL Seminar Room IV, O1.111 (Bldg. 99)

Wonhee Ko

Samsung Advanced Institute of Technology

Construction and Characterization of Topological Materials with Scanning Tunneling Microscopy

The role of topology in condensed matter systems has gained tremendous attention, especially after the recent discovery of graphene and topological insulators. The realization of massless Dirac fermions in these systems has led to new opportunities for exploring exotic physics stemming from relativistic quantum mechanics and quantum field theory. In this talk, we utilize Scanning Tunneling Microscopy/Spectroscopy (STM/STS) to both construct and characterize topological materials with atomic resolution. Molecular graphene, which is an artificial graphene-like structure, is built by arranging molecules to create a honeycomb lattice of electrons, which reveals band structure of massless Dirac fermions. Tailoring it exhibits various topological properties, such as quantum Hall-like states and topological boundary states. Also, topological properties of the materials grown ex situ are probed by STM/STS, such as the alloyed topological insulators Bi2-xSbxTe3-ySey, in which the spectroscopy and Landau level measurement revealed topological nature of the surface states. These experiments provide an unprecedented level of control over electronic states and allow experimental access to a set of phenomena that has previously been considered only theoretically.

Host: Sebastian Loth

MAX-PLANCK-GESELLSCHAFT