Type of communication: Oral

Submitted by: MIRANDA, Rodolfo
IMDEA Nanociencia y UAM
rodolfo.miranda@imdea.org

Periodically Rippled Epitaxial Graphene: An Electronically and Structurally Nanostructured Material

Rodolfo Miranda, IMDEA Nanociencia and Departamento de Física de la Materia Condensada. Univ. Autónoma de Madrid.

Graphene is an extraordinary material that allows a low energy manifestation of Quantum ElectroDynamics at surfaces. Its charge carriers behave as massless Dirac fermions with a group velocity ≈1/300 of the speed of light and display ballistic transport of charge and spin and a half-integer Quantum Hall Effect at 300 K. It behaves as a highly flexible membrane and its mechanical, optical and thermal properties are all remarkable.
Ultra perfect graphene monolayers, islands and ribbons can be epitaxially grown on many single crystal metal surfaces under Ultra High Vacuum conditions. These graphene layers are spontaneously nanostructured in a periodic array of ripples caused by the difference in lattice parameter between graphene and the different substrates. In-situ STM imaging of graphene monolayers grown on Ru(0001) or Ir (111) reveals that, in addition to the geometric corrugation, a much stronger electronic corrugation exists.
Examples will be shown of how these corrugated potential landscapes of epitaxial graphene provide with a periodic pattern that directs the self-assembly of different functional molecules on graphene. Implications of these findings towards a perfect atom mirror for a new Scanning Helium Atom Microscope and all-carbon electronic devices will be briefly discussed.