EMCMRE-1
Marrakech-Morocco
November 21-25 2011
First Euro-Mediterranean Conference on Materials and Renewable Energies (EMCMRE-1) 21-25 November 2011

Silicene and graphene, graphene and silicene – comparisons and prospects

Ari P Seitsonen
Physikalisch-Chemisches Institut, University of Zurich
E-mail : Ari.P.Seitsonen@iki.fi

Abstract:

Graphene, consisting of only carbon atoms, has become the target of vast amount of research, from basic science to development of components. Consisting of a single, flat layer of carbon atoms arranged in a honeycomb lattice graphene shows potential for many extraordinary applications. Many of the outstanding properties of graphene originate from its peculiar electronic structure, which is characterised by the Dirac cone with Fermi energy exactly at the apex of the cones.

Silicene resembles graphene in many respects: It is practically a two-dimensional material, ordered in a honeycomb lattice, even if with a buckling, and a Dirac cone constitutes the electronic band structure at the vicinity of the Fermi energy. Electronically the main difference between carbon and silicon is stronger preference of sp^3 over sp^2 in silicon. This explains the buckling in silicene, and it leads to an expectation that silicene cannot exist as a stand-alone material, unlike graphene.

In this keynote lecture we review the basic properties of both materials and recent progress in the research employing them. The the latter part we discuss the possible supports for silicene, and present novel density functional theory calculations for hypothetical supported structures.