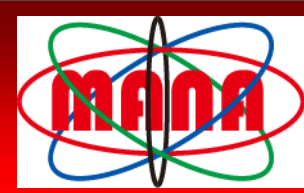


The 240th MANA Special Seminar



Beyond Graphene: Synthesis of Epitaxial Silicene Sheets

Chair: Dr. Masakazu Aono (MANA Director-General)

Prof. Guy Le Lay

(Aix-Marseille University, CNRS-CINaM, Marseille-Luminy, France)

We have just synthesized in Marseille silicene sheets, i.e., the silicon equivalent of graphene upon in-situ epitaxial growth on silver (111) surfaces. The honeycomb atomic structure with a lattice parameter of 0.39 nm is revealed in Scanning Tunneling Microscopy, while the long-range epitaxial order is confirmed by sharp Low Energy Electron Diffraction patterns. Conical band dispersions at the corners of the silicene Brillouin zone (K and K' points), evidenced in High-Resolution Synchrotron Radiation Angle-Resolved PhotoElectron Spectroscopy measurements, point to Dirac fermions, i.e., massless relativistic carriers, with quite the same Fermi velocity as graphene, and four times higher than previously obtained on a one-dimensional grating of silicene nano-ribbons. Density Functional Theory calculations in the General Gradient Approximation -including the Ag(111) substrate- confirm the stability of the epitaxial arrangement. The demonstration that silicon can form sheets of silicene, a two dimensional honeycomb low buckled structure, which does not exist in Nature, is tantalizing for new Physics. Silicon being the workhorse of electronics industry, this synthesis could have a major impact for novel devices because of the compatibility with existing Si technologies.

Venue: Seminar Room #431-432, 4F, MANA Bldg., Namiki

Date: **December 21st (WED)** **Time:** **15:30-16:15**

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