



東京大学 G-COE プログラムー未来を拓く物理科学結集教育研究拠点ー
Global Center of Excellence for Physical Sciences Frontier

G-COE Seminar

“Beyond Graphene: Synthesis of Epitaxial Silicene Sheets”

Prof. Guy Le Lay (Aix-Marseille University,
CNRS-CINaM)

日時 : 2011年12月20日(火) [Dec. 20 (Tue.), 2011] 、 16:00-17:30

場所: 理学部1号館4階431号室[Room 431, 4th floor, Science Bldg.1]

Abstract:

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.

紹介教員 : 長谷川修司教授 (物理学専攻)