

# Seminář odd. 26

## Tenkých vrstev a nanostruktur

Fyzikální ústav AVČR, Cukrovarnická 10, Praha 6

*datum:* 11. 2. 2011 pátek

*čas:* 11:00

*místnost:* knihovna, budova A 1.p.

### TÉMA

## Silicene discovery: from massively parallel nano-ribbons to two-dimensional sheets

**Dr. Guy Le Lay**

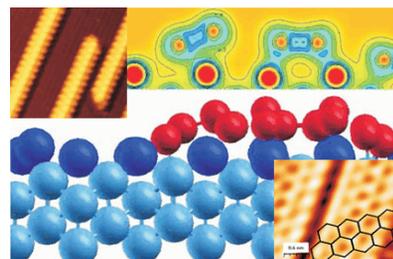
**CINaM-CNRS, Campus de Luminy, Marseille, France**

Silicene [1], the alternative of graphene for silicon, has been theoretically conjectured recently. Its synthesis has just been reported: silicon deposition onto Ag(110) surfaces reveals the formation of silicon nano-ribbons (NRs), in a massively parallel arrangement along the [-110] direction. Their atomic geometry was derived by high-resolution STM images showing a honeycomb arrangement, i.e., a silicene-like structure, further supported by theoretical calculations. These one-dimensional (1D) silicene NR's, showing quantized/edge states in STS imaging, self-assemble by lateral compaction to form a grating with a pitch of  $\sim 2$  nm covering the entire substrate surface. The band dispersion along the NRs direction reveals, as for graphene, massless Dirac fermions resulting from the 1D projection of  $\pi$  and  $\pi^*$  Dirac cones. This points to  $sp^2$  hybridization, which is further confirmed

1) by the incidence angle dependence of Electron Energy Loss Spectra near the silicon K absorption edge: the measured anisotropy is very similar to that found for the carbon K edge of HOPG graphite,

2) by the strong resistance toward oxidation.

Recently, two-dimensional silicene-like sheets have been also obtained in Marseille upon Si deposition onto Ag(111). Finally, the implications of these novel results for new physics and applications will be discussed.



[1] G.. G.. Guzman-Verri and L. C. Lew Yan Voon, Phys. Rev. B 76 (2007) 75131