复旦大学物理系物质科学报告

Physics Department Colloquium

Emerging synthetic graphene-like electronic materials: silicene and germanene

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Abstract:

Atomically thin two-dimensional (2D) materials are emerging as a new frontier of material science. Silicene and germanene, graphene's silicon and germanium synthetic analogues, have attracted considerable interest in the last years, as novel Si and Ge 2D allotropes and emerging 2D electronic materials [1,2]. They are created artificially in situ in ultra-high vacuum on metal substrates since they do not exist in nature. The recent fabrication of the first silicene FETs operating at room temperature demonstrates their potential for ultimate scaling of nanoelectronic devices [3].

In this talk, I will present the archetype 3x3 reconstructed silicene phase formed on a silver (111) substrate [4], its sister phases and next the growth of multilayer silicene, which hosts Dirac fermions and which is stable in ambient air, protected by its ultra-thin native oxide [5]. The recent synthesis of germanene will be also discussed [6].

Finally, the applications envisaged with these novel 2D materials will be addressed.

[1] G. Le Lay, Nature Nanotechnology, published online Feb. 2, 2015.

[2] A. Dimoulas, Microelectronic Engineering, 131, 68 (2015).

[3] Li Tao et al., Nature Nanotechnolgy, published online Feb. 2, 2015.

[4] P. Vogt et al., Phys. Rev. Lett., 108, 155501 (2012).

[5] P. De Padova et al., 2D Mater., 1, 021003 (2014).

[6] M.E. Dávila et al., New J. Phys., 16, 095002 (2014).

Time：2:00pm, Wednesday, April 29, 2015

Location：Physics Building, Room 221B

(Cookies and coffee will be served from 1:30 pm)