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S E M I N A R
aus
Halbleiterphysik und Nanotechnologie

Di, 30.01.2018, 11:00 Uhr, Hörsaal für Physik

"The silicon and germanium analogues of graphene"

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The impressive rise of graphene has spurred many scientists to look for alternative two-dimensional materials. The exploration of this new realm of two-dimensional materials has barely begun, its promises have not yet fully materialized, and the extent of its potential for new physics and devices remains largely unexploited. The most obvious alternatives for graphene are the group IV elements, i.e. silicon and germanium. In this talk I will give an update of our recent work on the silicon and germanium analogues of graphene, which are referred to as silicene and germanene, respectively. We have recently synthesized germanene on two different substrates: Ge_2Pt nanocrystals and MoS_2 [1,2]. Germanene is in many aspects very similar to graphene, but in contrast to the planar graphene lattice, the germanene honeycomb lattice is slightly buckled and composed of two vertically displaced sub-lattices [3]. The density of states of germanene synthesized on Ge_2Pt and MoS_2 exhibits a V-shape, which is one of the hallmarks of a two-dimensional Dirac system [2,4]. For the closely related systems silicon on MoS_2 [5] and WSe_2 [6] we have found clear evidence for intercalation.

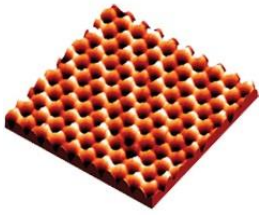

Figure caption Scanning tunneling microscopy image (4.5 nm by 4.5 nm) of buckled honeycomb lattice of germanene. Sample bias -0.5 V, tunnel current 0.2 nA.

References

[1] P. Bampoulis et al. *J. Phys. Cond. Mat.,* **26**, 442001 (2014).
[2] L. Zhang et al. *Phys. Rev. Lett.* **116**, 256804 (2016).
[3] A. Acun et al. *J. Phys. Cond. Mat.* **27**, 443002 (2015) and references therein.
[4] L. Zhang et al., *Appl. Phys. Lett.* **107**, 111605 (2015).
[5] R. van Bremen, et al. , *Beilstein J. Nanotech.* **8**, 1952 (2017).
[6] Q. Yao et al. , *Appl. Phys. Lett.* **109**, 243105 (2016).