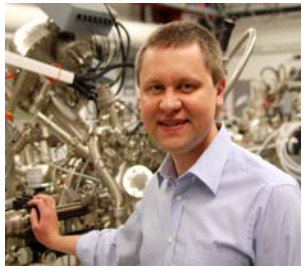
UNIKASSEL VERSITÄT

Physikalisches Kolloquium



Thursday, 28.05.15, 17:15, HS 100
Reception with coffee & cookies 16:45

Prof. Andrey Turchanin, Universität Jena

Free-standing 2D carbon materials: Novel opportunities for Nanoscience and nanotechnology

Abstract

In this talk it will be demonstrated how monolayers of aromatic molecules are employed to engineer novel free-standing 2D carbon materials. By electron or photon irradiation, aromatic monolayers are converted into dielectric carbon nanomembranes (CNMs) with a thickness of one molecule, which can be tuned from ~0.5 to 3 nm. CNMs possess high mechanical stability and similar to graphene or other atomically thin 2D materials (e.g., hBN, MoS2) can be separated from their original substrates and transferred onto various other substrates, fabricated as suspended sheets or stacked into multilayer films with precise control over their thickness. By annealing CNMs are converted into graphene.

This approach enables both scalable productions of graphene and direct writing of CNM or graphene micro and nanostructures employing e-beam or extreme UV lithography. Layer-by-layer assembly of vertical CNM/graphene heterostructures opens many doors to the engineering of novel materials with tunable electronic, optical and chemical properties. Their characterization by complementary spectroscopy, microscopy, electric and magnetoelectric transport measurements as well as implementation in novel field-effect devices will be presented.

References

[1] M. Woszczyna et al.: All-carbon vertical van der Waals heterostructures: Non-destructive functionalization of graphene for electronic applications. ***Adv. Mater.*** 26 (2014) 4831-4837

[2] D. G. Matei et al.: Functional single-layer graphene sheets from aromatic monolayers. ***Adv. Mater.*** 25 (2013) 4146-4151

[3] P. Angelova et al.: A universal scheme to convert aromatic molecular monolayers into functional carbon nanomembranes. ***ACS Nano*** 7 (2013) 6489-6421

[4] A. Turchanin and A. Gölzhäuser: Carbon nanomembranes from self-assembled monolayers: Functional surfaces without bulk. ***Prog. Surf. Sci.*** 87 (2012) 108-162

All of you interested in physics are cordially invited!

Contact: Prof. T. Baumert und Dr. A. Senftleben, More Information: uni-kassel.de/go/physikalisches_kolloquium