



TECHNISCHE UNIVERSITÄT  
CHEMNITZ

# Institut für Physik Physikalisches Kolloquium



**Mittwoch, 03.05.2017, um 16:00 Uhr**

Ort: Reichenhainer Str. 90;  
Zentrales Hörsaal- und Seminargebäude,  
Raum 2/N013

**Prof. Dr. Christian Teichert**

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## Organic semiconductor nanostructures on van der Waals materials

Crystalline films of small semiconducting organic molecules offer attractive potential for organic solar cells, organic light emitting diodes, and organic field effect transistors on flexible substrates. However, these applications either require a transparent and flexible electrode material or flexible gate dielectrics. Here, the novel two-dimensional (2D) van der Waals materials like graphene (Gr) or ultrathin hexagonal boron nitride (hBN) come into play. Since small conjugated molecules like the rod-like molecule para-hexaphenyl (6P) fit well to the hexagonal structure of 2D materials, growth of 6P on Gr can be expected in a lying configuration as has been indeed observed for growth of 6P on Pt(111) in a layer by-layer fashion at 240 K [1].

On exfoliated, wrinkle-free graphene, we observed by atomic-force microscopy the formation of 6P nanoneedles (composed of lying molecules) following discrete orientations defined by the Gr lattice. This needle growth can be utilized to sense the cleanliness of chemical vapor deposited Gr which is transferred by polymethylmethacrylate (PMMA) to any support [2]. For 6P growth on ultrathin hBN – which is a 2D insulator – again needle-like structures with preferential growth directions  $\pm 5^\circ$  off the zigzag direction of the substrate are observed [3]. This finding could be explained in conjunction with density functional theory calculations by the formation of a (-629) contact plane of bulk 6P. Finally, preliminary results for the growth of polar, acene-like molecules on Gr and hBN will be presented.

[1] G. Hlawacek, et al., Nano Lett. **11**, 333 (2011).

[2] M. Kratzer, et al., Appl. Phys. Lett. **106**, 103101 (2015).

[3] A. Matković, et al., Sci. Rep. **6**, 38519 (2016).

Alle Zuhörer sind ab 15:45 zu Kaffee und Tee vor dem Hörsaal eingeladen.

Informationen zum Vortrag erteilt:

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