

"Parahexaphenyl growth as a sensor to cleanliness of graphene"

Christian Teichert

Institute of Physics, Montanuniversität Leoben, Austria

Crystalline films of small organic semiconductors offer attractive potential for optoelectronic applications on flexible substrates. However, these applications require a transparent and flexible electrode material; and here the novel material graphene (Gr) comes into play. Since small conjugated molecules like the rod-like oligophenylene molecule parahexaphenyl (6P) fits well to the hexagonal structure of graphene, growth of 6P on Gr can be expected in a lying configuration.

As demonstrated recently by in situ by low-energy electron microscopy, 6P grows at 240 K indeed in a layer-by-layer mode with lying molecular orientation on Ir(111) supported graphene [1]. Islands nucleate at Gr wrinkles [2]. At higher temperatures, needle-like 6P crystallites - also composed of lying molecules are observed [3]. Also on exfoliated, wrinkle-free graphene, such needles develop with discrete orientations defined by the Gr lattice as was detected by atomic-force microscopy (AFM) [4]. Needles are never observed on contaminations or on the silicon oxide substrate. There, exclusively islands composed of upright standing molecules are observed. Since these islands are easily detected by AFM, growing 6P can be used to sense the cleanliness of various graphene substrates.

[1] G. Hlawacek, et al., *Nano Lett.* **11** (2011) 333. [2] G. Hlawacek, et al., *IBM J. Res. Devel.* **55** (2011) 15. [3] F. Khokar, et al., *Surf. Sci.* **606** (2012) 475. [4] M. Kratzer, *J. Vac. Sci. Technol. B* **31** (2013) 04D114.