Nanostructured Graphene: Controllable *in-situ* Growth, Structure and Properties

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The graphene grown on low-cost cubic-SiC/Si(001) wafers usually contains nanometer-sized domains with few different lattice orientations [1]. Here we present the in-situ investigation of layer-by-layer graphene growth on such wafers. The measurements were performed by means of a number of methods: scanning tunneling microscopy with atomic resolution, low-energy electron microscopy (LEEM), high-resolution laterally-resolved X-ray photoelectron spectroscopy (μ-XPS), angle-resolved photoelectron spectroscopy (μ-ARPES), and micro low-energy electron diffraction (μ-LEED) [2]. The experimental data evidence the opportunity to in-situ control the local thickness of the graphene overlayer on the silicon carbide substrate in-situ during UHV synthesis. Significantly, presented data disclose the mechanisms of the surface transformation and layer-by-layer graphene growth on cubic-SiC/Si(001) in UHV at high temperatures. Finally, we will briefly report the electronic structure, transport and magnetic properties [1-3].

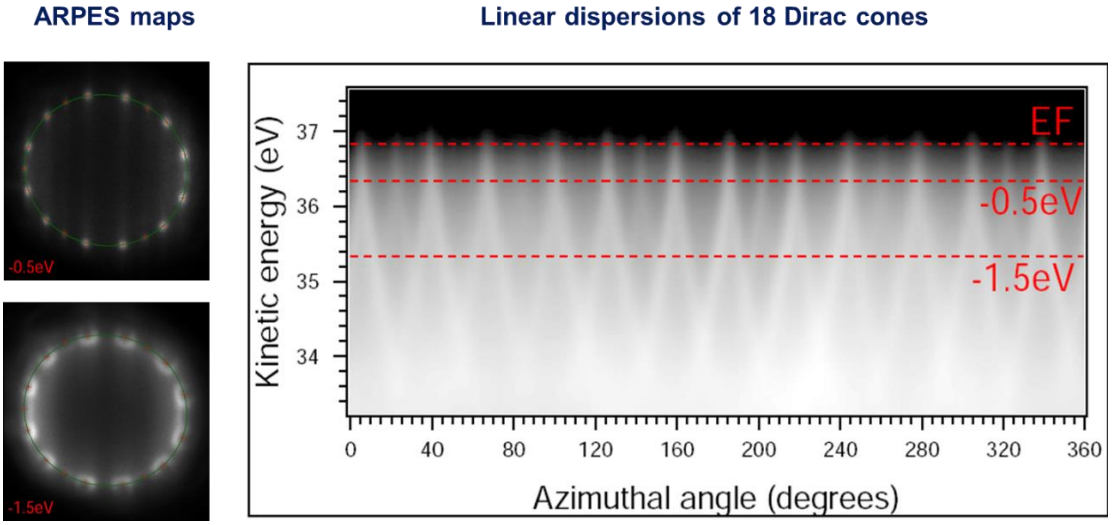

Fig. 1. Characterization of 3 ML nanostructured graphene by ARPES [2]

[1] A. N. Chaika, V. Yu. Aristov and O. V. Molodtsova, Progr. Mater. Sci., **89**, 1-30 (2017)
[2] V. Yu. Aristov, A. N. Chaika, O. V. Molodtsova *et al*., ACS Nano, **13**, 526-535 (2019)
[3] H.-C. Wu, A. N. Chaika, *et al*., Nature Commun., **8**, 14453 (2017)