Electronic properties of low dimensional structures

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Abstract: The electronic states in low-dimensional nanostructures are not only quantized but also exhibit novel properties through the oscillatory behavior and enhancement of electronic correlations. Surfaces are ideally suited for the preparation of such structures while surface sensitive methods reveal many of their properties. We have expertise in angle-resolved photoemission spectroscopy (ARPES) and scanning tunneling microscopy (STM), which enables us to precisely characterize the structure of nanostructures and study the electronic properties both in the *k* and real space. By means of these methods we have studied properties of ultra thin metallic films [1,2] deposited on well-defined metallic substrates. More recently, graphene, a true example of a two-dimensional material is in the focus of our research. The promising application of graphene in transistors, batteries, screens, or chemical sensors, still requires answers to very serious challenges such as high-quality production, manipulation of its band structure, or contacting in devices. We grow high-quality graphene by hydrocarbon decomposition on metal surfaces. This readily opens routes for the manipulation of its electronic structure and in the regime of a weak interaction with the substrate a very fundamental behavior of charge carriers in graphene can be explored. For example, by means of ARPES we have studied properties of Dirac electrons subjected to superperiodic potential which opens a corresponding band gap [3].

(*) http://surface.ifs.hr/

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