

Seminář odd. 26

Tenkých vrstev a nanostruktur

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TÉMA

Nanoscience with molecular nanostructures

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Our research focuses on nanoscience with low-dimensional molecular nanostructures, such as carbon nanotubes (SWCNTs) and metal-organic frameworks (MOFs). SWCNTs are one-dimensional (1D) conductors in which quantum confinements along the tube's circumference leads to unique one-dimensional electronic properties, e.g. the van Hove singularity and Tomonaga-Luttinger-liquid. In turn, MOFs represent a new class of compounds that consist of metal nodes and organic ligands to form 1D, 2D and 3D nanostructures exhibiting advanced optical, electronic and magnetic properties. The interior spaces of such nanostructures allow foreign atoms and molecules to be assembled in low dimension as well as to functionalize the host nanostructures. While clusters and molecules that are arranged in low dimension can outperform their bulky counterparts, optimally functionalized SWCNTs and MOFs with defined properties can be implemented in electronic devices such as solar cells, batteries and sensors. Our experimental research, by means of photoemission, Raman, ultraviolet-visible absorption spectroscopy, X-ray diffraction, electron microscopy, magnetisation and magnetotransport measurements, aims at understanding low-dimensional properties of MOFs and SWCNTs functionalized by chemical and electrochemical doping, and elucidating electronic and magnetic interactions at guest-host molecular interfaces that are responsible for their unique physical properties..

odborný garant: *Ing. Pavel Jelínek, Ph.D.*