

MIMOŘÁDNÝ ÚSTAVNÍ SEMINÁŘ

vystoupení žadatelů o Akademickou prémii pro perspektivní výzkumné pracovníky – Lumina quaeruntur

proběhne ve středu **19. 9. 2018** od 12:30
v přednáškovém sále Fyzikálního ústavu AV ČR
na Slovance

Program:

- 1) Marek Paściak (oddělení 12, sekce 2):

In-silico dielectric material exploration

We propose a new materials design research program in which the search for new dielectric compounds with desired properties is supported by the state-of-the-art computational tools. Ab-initio high-throughput calculations are currently extensively used in conjunction with smart screening procedures that fill databases with thousands of hypothetical materials and their properties. The novelty of our approach lies in the use of the second-principles methods that allow for property prediction for large systems with a complex mesoscale structuring. In this way, our high-throughput scheme can include disordered or partially ordered materials as well as engineered domain and layered structures or composites. In the talk I will also briefly mention our recent results that show the capabilities of large-scale atomistic modeling in explaining various experimental results as well as in predicting material properties.

- 2) Jakub Plášil (oddělení 19, sekce 3):

Uranium at geochemical interfaces

Behavior and fate of uranium in the Environment is driven by physical and chemical properties of solid-state compounds (i.e. minerals) that concentrate this element. The proposed research aims to study environmentally important uranyl minerals that are only poorly characterized (with unknown crystal structures and physical properties), and to study processes that lead to their formation as well as their destruction (dissolution/hydrolysis). The proposed study will utilize namely a fast-growing branch of electron diffraction tomography (PEDT) methods on transmission electron microscopes (TEM) that enables structure studies from grains with dimensions of nanometers.

3) Lukáš Ondič (odd. 26, sekce 3):

Diamond nanophotonic systems

Nitrogen, silicon and germanium vacancies in diamond are light-emitting optical centers that attract attention mainly due to their potential use as single-photon sources in quantum photonics applications. However, their electronic structure meets also requirements for a laser system. Laser light emitted from the centers' ensemble could be used to resonantly initiate spin states of a single center of an identical type. In the submitted project, we plan to experimentally explore the potential of ensembles of optical centers to be used as an active laser medium. We will attempt to realize a simple concept of an all-diamond optical network based on such optical centers. During my talk, I will explain the essence of this project that should lead to the viable realization of such system. The success of the project will represent an important breakthrough in the field of quantum photonics.

4) Hana Lísalová (odd. 21, sekce 4):

Molecular-level Mechanisms of biofouling at functional synthetic surfaces: From new theories to novel bio-inspired materials

Nonspecific adhesion of biomolecules and cells to synthetic surface, i.e., "biofouling" is a persistent global problem in many fields: ranging from nanoscale (e.g., drug delivery), implants, analytical devices, up to large ship hulls. Further exploitation of such devices in practice is hampered due to lack of understanding of processes occurring at material/biological medium interfaces. The main goal of this research program is a fundamental molecular-level understanding of mechanisms of surface-mediated nonspecific and specific molecular interactions in biological fluids using functional low-fouling coatings with well-defined properties and advanced experimental techniques. A systematic study on the relationships between functional surface properties and real-world samples will be performed to provide a sufficient knowledge base to reveal biofouling mechanisms. New strategies to design functional coatings with desired properties will be examined. If successful, this research program will provide cutting-edge understanding of phenomena occurring at the interface between synthetic materials and bodily fluids or living cells.

Vystoupení navrhovatelů proběhne v anglickém jazyce. Přednášky budou mít délku 20 minut a po každé z nich bude následovat diskuse v délce max. 10 minut.

RNDr. Michael Prouza, Ph.D.
ředitel Fyzikálního ústavu AV ČR

Colloquium of the Institute of Physics of the Czech Academy of Sciences

Presentations of applicants for the Academic Award – Lumina Quaeruntur

on Wednesday, September 19th, 2018 at 12:30 p.m.
in the lecture hall of the Institute of Physics Na Slovance

Programme:

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The colloquium will be held in English. Each presentation will take 20 minutes, followed by 10 minutes of discussion.

Michael Prouza, Ph.D.
Director