

Topic: CE-NMBP-25-2019: Photocatalytic synthesis (RIA)

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Deadline: 22nd January 2019 (1st stage) – 3rd September 2019 (2nd stage)

Description of the offered expertise

Preparation:

- Vacuum deposition of both inorganic and organic materials (small sample scale) and *in-situ* characterization. Materials include: metals/semiconductors and metal alloys (evaporation) and oxides (pulsed laser deposition from targets) and their combinations without braking vacuum. For oxides we can tune the concentration of oxygen vacancies.

Characterization:

- Surface chemical analysis by unique set of complementary techniques: X-ray Photoelectron Spectroscopy (XPS) – bond specific analysis of chemical composition of solid materials, Auger Electron Spectroscopy (AES) – chemical composition with <10 nm spatial resolution, Secondary ion Mass Spectroscopy (SIMS) – high sensitivity up to ppb level and 3D compositional analysis, and Low Energy Ion Scattering (LEIS) – for chemical analysis of top-most sample layer. We have rich experience in data evaluation and interpretation (publication profile).

Description of potential role

Key partner for:

- Preparation and modification of active surfaces for photocatalytic synthesis: deposition of defined complex oxides (perovskites) and their functionalization by metal atoms, photo-harvesting molecules, or nanoparticles.
- Surface chemical analysis (see above) of samples in distinct phases of reaction cycle to reveal any chemical modification, i.e. catalyst deactivation.
- Fundamental surface science studies on project relevant systems: both deposition and characterization can be done *in-situ*. The molecular and supramolecular layers on solid surfaces belong to key research topics in our group research.
- We have access to wide portfolio of preparation and characterization techniques within CEITEC CF Nano facility (<http://nano.ceitec.cz/>) to extend the methodology available to consortium (HRTEM, lithography, structural analysis).

Reference to previous successful projects, products, patents and market applications (Max 5)

2018 – 2021: Plasmon Enhanced Terahertz Electron Paramagnetic Resonance (EC-FET Open, coordinated by T. Šikola, BUT): Running. Our project role: Key scientist responsible for proof-of-principle experiments and applications of developed Plasmon Enhanced THz EPR spectrometer/microscope.

2018 – 2020: R&D of Bulk Semiconductor Material with Wide Bandgap (Technology Agency of the Czech Republic, PI: Miroslav Kolíbal): Running our project role: Senior scientist responsible for surface chemical analysis in the development of SiC based devices.

Note: Group Molecular Nanostructures at surfaces has been established in 2018, hence we do not have track of records in European level projects as coordinator/partner group yet.

Group profile: www.ceitec.eu/cechal

Group pages: surfaces.ceitec.cz