

PHYSICAL CHEMISTRY

Preparation and characterisation of degradable metallic biomaterials with bioactive coating.

supervisor: prof. RNDr. Renáta Oriňaková, DrSc. (renata.orinakova@upjs.sk)

study form: full time

Annotation: Preparation of degradable iron-based biomaterials by powder metallurgy methods. Study of possibility to modify the surface of produced materials with bioactive drug- or antibacterial nanoparticles-releasing coatings and release kinetics. Characterization of prepared biomaterials and investigation of its degradation, biocompatibility, and mechanical properties. Optimisation of preparation conditions of biomaterials with controlled drug release.

Novel effective catalysts for electrolyzers and fuel cells.

supervisor: prof. RNDr. Renáta Oriňaková, DrSc. (renata.orinakova@upjs.sk)

study form: full time

Annotation: Production of novel effective platinum-free catalysts based on more abundant and affordable metals by different methods, e.g. electrochemical deposition and electrospinning. Characterisation of produced catalysts in term of their composition, structure, morphology, stability and electrocatalytic activity toward hydrogen evolution reaction and oxygen oxidation reaction.

Preparation and characterization of electrode materials for post-Li ion batteries.

supervisor: assoc. prof. Andrea Straková Fedorková, PhD. (andrea.fedorkova@upjs.sk)

study form: full time

Annotation: Preparation and characterization of new composite materials based on sulfur with conductive additives such as carbon, graphite, graphite oxide, polypyrrole and other. These materials will be tested as new cathodes for post-Li ion batteries where heavy metals are replaced by cheaper and environmentally benign materials. Different electrochemical techniques as cyclic voltammetry, electrochemical impedance spectroscopy or galvanostatic charge/discharge measurements will be used for characterization of as prepared materials. The main goal of this research is to improve the capacity and performance of new composite materials.

Non noble metals catalysts for LOHC technologies.

supervisor: prof. RNDr. Andrej Oriňak, PhD. (andrej.orinak@upjs.sk)

study form: full time

Annotation: Preparation and testing of novel non noble metal catalysts for LOHC technologies. Characterization of prepared catalysts, modelling their surface energy and activation energy and structure. Test of catalysts activity on hydrogenation/dehydrogenation of dibenzyltoluene.