

Opis delovnega mesta mladega raziskovalca/ke (*Description of the Young Researcher's position*)

1. Članica UL (*UL member*):

Fakulteta za kemijo in kemijsko tehnologijo (FKKT)

2. Ime, priimek in elektronski naslov mentorja/ice (*Mentor's name, surname and email*):

Boštjan Genorio – bostjan.genorio@fkkt.uni-lj.si

3. Raziskovalno področje (*Research field*):

Materiali, Elektrokemija, Energija, Kemija materialov

4. Opis delovnega mesta mladega raziskovalca/ke (*Description of the Young Researcher's position*):

Vključuje morebitne dodatne pogoje, ki jih mora izpolnjevati kandidat/ka za mladega raziskovalca/ko, ki niso navedeni v razpisu za mlade raziskovalce.

slo:

Raziskave bodo potekale v mednarodnem okolju v sodelovanju z usposobljenimi znanstveniki in v sodelovanju s partnerskimi laboratoriji iz EU in ZDA. Raziskava se bo osredotočila na razvoj elektrokemijske medfaze, ki je tesno povezana z napravami za shranjevanje in pretvorbo energije.

Cilj raziskave je sintetizirati nov razred elektrokemijskih medfaz, ki bodo v osnovi planarne arhitekture z edinstvenimi, krojenimi fizikalnimi in kemijskimi lastnostmi. Nove medfaze na elektrodi bodo povečale selektivnost sistema. To bo ustvarilo bolj selektivne, aktivne in stabilne medfaze, ki bodo pozitivno vplivale na ključne značilnosti delovanja naprav za shranjevanje in pretvorbo energije. Kot vmesni sloji bodo uporabljeni derivati grafena, polimeri in keramike.

Kandidat bo v našem laboratoriju uporabljal najsodobnejše tehnike za pripravo elektrod, CVD za rast grafena, PLD za nanašanje keramike ter različne kemijske in fizikalne metode za modifikacijo površine. Pripravljene medfaze bo nato karakteriziral z uporabo različnih elektrokemijskih metod, STM, AFM, SEM, TEM, Ramanove spektroskopije in XPS, da bi dobili podrobno sliko kemijske in morfološke sestave površine ter učinkov na elektrokemijski odziv. Pridobljeno znanje bo nato kandidat uporabil za integracijo inženirskih medfaz v/na materialih za elektrokemijske reakcije, ki so ključnega pomena za naprave za pretvorbo in shranjevanje energije, kot so gorivne celice, baterije in psevdokondenzatorji.

Zahtevano:

- Odlično znanje angleščine
- Osnovna znanja o materialih in funkcionalizaciji materialov
- Poznavanje osnov elektrokemije

eng:

The research will be conducted in an international environment by qualified scientists and in collaboration with laboratories from the EU and the USA. The research will focus on the development of the electrochemical interface, which is closely related to energy storage and conversion applications.

The research aims to synthesize a new class of electrochemical interfaces that will be developed by modifying the conventional electrode-electrolyte interface with planar architectures with unique, tunable physical and chemical properties. The novel electrode-interlayer electrolyte interfaces will increase the selectivity of the system by screening the active species. This will create more selective, active and stable interfaces that will positively impact key performance characteristics of energy storage and conversion devices. Engineered graphene derivatives, polymers and ceramics will be used as interlayers.

The candidate will use our state-of-the-art techniques for electrode preparation, CVD for graphene growth, PLD for ceramic deposition, and various chemical and physical methods for surface modification. These interfaces will then be characterized in detail using various electrochemical methods, STM, AFM, SEM, TEM, Raman spectroscopy, and XPS to obtain a detailed picture of the chemical and morphological composition of the surface and the effects on the electrochemical response. The knowledge gained will then be used to integrate engineered interfaces in/on materials for electrochemical reactions, which are of great importance for energy conversion and storage devices such as fuel cells, batteries and pseudocapacitors.

Required:

- Excellence in English
- Basic knowledge of materials science and functionalization of materials
- Knowledge of the fundamentals of electrochemistry