Seminar

Development, characterization and transfer of optically active nanocomposites for sensors and environmental applications

Ass. Prof., Dr. Roman Viter

Optical biosensors and functional nanomaterials laboratory,
Institute of Atomic Physics and Spectroscopy,
University of Latvia

Date: June 25th 2024
Time: 12:15
Venue: Room 318, Department of Engineering

The presentation will show recent advances in electrospinning for fabrication of optical nanomaterials and drug delivery, alternative optical methods for non-destructive testing of polymers and complex structures. Electrospinning is a powerful method to fabricate one dimensional nanostructures. It allows to form polymeric fibers and transform them into metal oxide nanostructure with high surface area. Due to low selectivity of metal oxides towards metal ions, the composite metal oxide-ligand have been developed. The first part of the presentation will demonstrated recent achievements in fabrication of metal oxide-ligand nanofibers for optical metal ion detection will be discussed.

Polymeric nanofibers are good structures for improve drug dissolution. Forming amorphous solid dispersion will provide stabilization of drug and enhance dissolution. Second part of the presentation will focus of polymer-drug amorphous solid state dispersions formulations in electrospun nanofibers. Co-axial electrospinning technique is a powerful method for fabrication of new heterostructures with tailored optical properties. Putting in the core magnetic material, we can manipulate the nanostructures in water environment. Third part of the work will show new approaches and achievements in fabrication and characterization of core-shell nanofibers with magneto-optical properties by co-axial electrospinning.

Optical methods are suitable for characterization of composite polymer materials, their composition and degradation. In the presentation, application of non-destructive optical methods in UV-VIS-FTIR region will be applied for testing of polyethylene-chitosan and bitumen-lignin formulations.

Roman Viter received his master in Physics in Odessa National University (Ukraine) in 2000. He continued his PhD studies in 2003 at Odessa National University on development of fiber optic chemical sensors, based on tin dioxide nanostructures. In 2011, he received his PhD in the field of Physics of Semiconductors and Dielectrics focusing on the modelling and characterization of tin dioxide nanofibers for ammonia sensing liquid media. In 2012 he joined University of Latvia as postdoc researcher. In 2014 he obtained a position of Senior researcher at Institute of Atomic Physics and Spectroscopy, University of Latvia. In 2020 he became a head of newly established Laboratory Optical biosensors and functional nanomaterials, Institute of Atomic Physics and Spectroscopy, University of Latvia. Since 2021 he is an associate professor at Faculty of Physics and corresponding member of Latvian Academy of Science.

He has published more than 110 journal articles in high quality venues like Sensors and Actuators B, Biosensors and Bioelectronics, Science of Total Environment, which have cited over 4000 times. The research of his group is focused on development of new nanomaterials by electrospinning and hydrothermal synthesis, composite materials, drug delivery nanofibers, optical chemical and gas sensors, optical biosensors and 3D printing.

Dr. Roman Viter has strong collaboration with Italy (Biosensor srl, CNR Napoli, FBK, University of Sannio, etc.). One of the goals of the presentation is to define new topics for joint student supervision, collaborative research and new joint project.

All are cordially invited to attend