Corsi organizzati per l'anno accademico 2021-2022

Upcycling Polymers to Address the Plastic Waste Crisis: Catalytic Methods, Materials, and Innovation

Prof. Aaron Sadow, Department of Chemistry and Ames Laboratory, Iowa State University, Ames, USA;
sadow@iastate.edu, https://sadow.chem.iastate.edu/

The course (8 h) discuss challenges associated with the plastic waste crisis, emanating from the large and ever-increasing amounts (currently 300 million tons annually) of plastics discarded after use. Current approaches, such as mechanical recycling, and their limitations due to 'downcycling' will be reviewed, and then incipient methods for upcycling conversions will be discussed. The course touches upon principles from organic and polymer chemistry, heterogeneous catalysis, and molecular organometallic chemistry and catalysis.

[November 2021]

Enzyme immobilization: rational basis for turning an enzyme into an efficient biocatalyst

Dr. Anamaria Todea, Dipartimento di Scienze Chimiche e Farmaceutiche, Università degli Studi di Trieste; atodea@units.it
Synopsis

[February 2022]

Optical Microscopy

Prof. Robert Pal, Department of Chemistry, University of Durham, UK;
robert.pal@durham.ac.uk, https://www.durham.ac.uk/staff/robert-pal/

A course covering all aspects of optical microscopy: from the early years and stages of microscopy (historical overview) to the novel cutting edge optical resolution barrier breaking nanoscopy techniques (detailed instrumental and application specific review). The course will also detail vital sample preparation, image acquisition and processing techniques/tips and will also address the important physical and engineering principles behind the modern day optical imaging equipment and auxiliary devices. Image processing techniques and third party software usage tips. Important techniques and tips for sample preparation and in situ hands on demonstration of transmission and epi-fluorescence microscopy.

[May 2022]

The Metal Vapour Synthesis (MVS) technique: a valuable tool for the preparation of metal nanoparticles

Dott.ssa Laura Antonella Aronica, Dipartimento di Chimica e Chimica Industriale, Università di pisa; laura.antonella.aronica@unipi.it

The course (8h) will focus on:
i) general methods for the synthesis of nanoparticles and their characterization;
ii) MVS technique: the basic principles, the reaction vessel, design of the experiment, solvated metal atoms;
iii) MVS derived powder and supported nanoparticles: catalytic activity, regio and stereoselectivity, reusability;
iv) bimetallic nanoparticles: examples and applications.

[May 2022]

Translational chemistry: from molecular and nanomaterials synthesis to personalized medicine using MS spectrometry

Prof. Carlos Lodeiro Espiño, Prof. José Luis Capelo Martínez, BIOSCOPE, LAQV-REQUIMTE, Nova Univesity of Lisbon, Portugal;
https://www.bioscopegroup.org/, cle@fct.unl.pt, jlcm@fct.unl.pt

The current research world is based more and more on interdisciplinary research with multifunctional applications and inter laboratory collaborations: this is Translational Chemistry. In connection with this idea a research group needs to face different issues connected to the whole process, from synthesis to application.

In this PhD course, we will show you some key aspects for the optimisation of the synthesis of nanoparticles and sensors, together with their application in biomedicine, proteomics, and environmental fields. Detection of metals, molecules and anions, imaging and delivery of drugs, and proteomics/genomic studies applied in personalized medicine using High resolution mass Spectrometry and the total protein approach (TPA) will be taken into account.

The program is divided in four blocks of 90 minutes each plus questions and discussion for the students (total 2h each).
1.- External stimuli-responsive Photoluminescence and Nanostructured Materials. Preparation and applications.
2.- Green Methodologies in the synthesis of Metal and Silica Nanoparticles. Biomedical and Catalytic Applications
3.- Translational Chemistry: where no other chemistry has gone before.
4.- High resolution Mass Spectrometry and TPA for OMICS applications: theory and practical applications.

[Canceled]