

SENM 2017 WORKSHOP

Smart Engineering of New Materials



1. The use of fluorescence microscopy

During the course, we will introduce methods of visualization of living cells on abiotic surfaces. We will present research methods using fluorescent dyes that allow to distinguish live cells from dead, and compare them with staining dyes based on non-fluorescent ones. As model organisms we will use bacterial and fungi cultures. One additional aspect will be presentation of examples of dye used during the tests bacterial biofilm formation on metal surfaces and surfaces of the fluorescent polymers. Finally, selected methods for the determination of the metabolic activity of the cells adhered to the surface of biomaterials will be presented.

2. Parylene coatings

A subject of the workshop is a process of vacuum deposition/polymerization of xylylene polymers, commonly known as Parylene technology. A number of different substrates, ranging from hygienic paper to simple printed board circuits (PBCs), will be coated with films of Parylene C in order to present unique characteristics of the coatings, such as their hydrophobicity, excellent barrier and dielectric properties or mechanical strength. A role of process operational parameters as well as different Parylene applications will also be discussed.

3. Materials Investigation Methods

During the workshop two basic investigation techniques will be presented: Scanning Electron Microscopy and X-ray diffraction methods. The program of workshop includes the presentation of the main principles of operation of both techniques as well as advanced techniques of investigation possible to perform with their use. During the SEM part the participants will have the opportunity to familiarize themselves with such techniques as SEM-EDS, SEM-EBSD and ion cross polishing as well, whereas the XRD part will include the qualitative and quantitative phase analysis, stress analysis, determination of parameters of thin layers and multilayered systems using the X-ray reflectivity and grazing incidence X-ray diffraction methods.

4. Raman spectroscopy of carbon materials

During the workshop participants will be introduced to the Raman spectroscopy technique – a particularly valuable tool in the characterization of carbon nanomaterials. Participants will have the opportunity to examine the structure of carbon materials, such as inter alia, graphene, carbon nanotubes or diamond-like carbon (DLC) thin films, and they will get acquainted with the interpretation principles of the received spectra.

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5. Polysaccharide nanocomposite fibres for medical application

In this workshop the participants will learn how to produce nanocomposite calcium alginate fibres by wet spinning process. The three steps of producing fibres will be performed as: Step 1 – sonication process if they use nanoadditives, Step 2 – rheological properties (the rheological properties of the spinning solutions will be tested with a rotational rheometer Anton Paar RheolabQC) and Step 3 – wet spinning process (influence as-spun draw ratio and total draw ratio for structure and properties these fibres).

6. Design Thinking

Design Thinking workshop is a course on creative and innovative way to solve problems. The goal of this workshop is to experience what design thinking is, boost your creativity and get to know the whole path of solving process – empathy, definition, ideation, prototyping and testing your solution.

7. Flexible electronics

The workshop will be focused on selected manufacturing technologies used in the production of flexible electronic devices, such as displays or photovoltaic cells. During the workshop, flexible electronic layers' deposition technologies on substrates such as plastic, flexible glass, textiles and polymer or metal foils will be introduced. The deposition technologies such as scree-printing, gravure and flexography, spray coating and spin coating will be described and demonstrated. The workshop will also present the mechanical and/or thermal fatigue tests on selected samples. The requirements and challenges for flexible electronic devices will be discussed.

8. Optical fibre technology

During the Workshop participants will design Fibre To The Home Network. First they will have short presentation about the rules during the design of FTTH networks process. Participants will calculate the power budget. Furthermore they will select active and passive elements for designed optical network.

9. Energy from the wind

During the Workshops participants will be able to see what factors influence the performance of wind turbines. Not only the impact of shape and number of rotor blades will be studied, but also the influence of wind direction, changing wind speed, used materials and construction of the entire wind turbine.