**Course on “Fundamental technologies for Micro-BioRobotics”**

Start: 23.01.2014 (total 20 h)

Exam: test and/or journal club

NB: Safety lesson will be concentrated in one day, to provide immediately people with best practice skills.

Teacher: Carlo Filippeschi

Program

Good practices in the IIT@SSSA clean room laboratory 1h

* *An overview on clean room access, facilities booking system,, safety, personal protective equipment, handling and storing of materials..*

Clean room micro/nano manufacturing and characterization processes a basic introd. 2h *Main equipment/technologies:*

* *dual beam microscopy workstation*
* *3D laser nanolithography*
* *microlithography and thin film deposition*
* *ancillaries equipment*

What you could do with: 2h

* *Some ideas and practical examples on how to use the equipment to produce micro and nano devices.*

Teacher: Gianni Ciofani

Program

Good practices in the biological laboratory 1h

* *Biosafety levels; personal protective equipment; general rules in the biological lab at the CMBR.*

Nanomaterials and nanostructured surfaces for biomedical applications 2h

*Examples of nanomaterials investigated at the CMBR:*

* *boron nitride nanotubes,*
* *barium titanate nanoparticles,*
* *cerium oxide nanoparticles;*

*Examples of nanostructured surfaces:*

* *direct laser writing of substrates for cell culturing*

Techniques for biological investigation of nanostructured materials 2h

* *Fluorescence and confocal microscopy; immunocytochemistry; quantitative real-time PCR;*
* *Standard cytocompatibility evaluations*

Teacher: Francesco Greco

Program

Smart materials for micro-robotics 2h

* *Introduction to smart materials*
* *Overview on smart active materials: actuation and sensing*

Smart polymers for micro-biorobotics @CMBR 1h

*Examples of materials investigated at the CMBR of IIT in the areas of:*

* *polymers and (nano)composite materials for actuation, sensing, energy harvesting in micro-robotics;*
* *materials for flexible/stretchable/conformable electronics;*
* *nano- and micro-structured surfaces for sensing and as smart biointerfaces*

Techniques for fabrication and investigation of materials and surfaces 2h

* *Ink-jet printing, CO2 laser cutting and engraving, Langmuir-Blodgett deposition*
* *Scanning Electron Microscopy (SEM), Atomic Force Microscopy (AFM), Dynamic Light Scattering, Tensiometer (Contact angle), Rheometer*

Teacher: Gian Luigi Puleo

Program

Good practices in the IIT@SSSA chemistry laboratory 1h

* *Chemical safety; personal protective equipment; general rules in the chemistry lab at the CMBR.*

Chemistry for surface and material modification for micro-biorobotic applications 2h

*Examples of chemical modification of nanomaterials:*

* *Ionic modification*
* *Covalent modification,*
* *Ligand substitution*

*Examples of chemical modification of nanostructured surfaces:*

* *Deposition, Chemisorption, Physisorption*
* *Covalent modification,*

*One step molecules synthesis*

Techniques for chemical synthesis and materials modification characterization 2h

* *Inert gas apparatus, colorimetric test, precipitation, surface cleaning.*
* *FT-IR Spectroscopy, HPLC-GPC Purifications, Differential Scan Calorimetry (DSC) , Spectrophotometry UV-Vis.*