Summer School in NCSR "Demokritos"
12 – 16 September 2011, Athens, Greece
"Methods in Micro – Nano Technology and Nanobiotechnology"

Organizer:
National Center for Scientific Research "Demokritos"
in collaboration with
Foundation of Biomedical Research of the Academy of Athens
and
Micro&Nano Scientific Society

Information: www.imel.demokritos.gr

Target

- Modern Research takes advantage of Micro and Nanotechnology developments
- Merging areas of research (Nanobiotechnology) demand interdisciplinary skills
- Necessary for researchers from Chemistry, Engineering, and Life Sciences to acquire skills in Micro and Nanotechnologies, nanomedicine

Establish common language between the various disciplines- promote interdisciplinary research

The summer school offers: classroom and laboratory experience on:
micro and nano-technology processes / applications
Targeted in: Nanobiotechnology, Nanomedicine

Who should attend

Group leaders involved in molecular biology or biotechnology
Post Doctoral Fellows, Graduate students with
Life Science / Science / Engineering background, medical doctors
All those who wish to apply micro-technology in their research

Maximum number of attendants: 20

Fees: 800 Euro
(includes handouts, coffee-breaks, lunches, NO accommodation)
Partial scholarships will be available for participants from organizations-members of the **Micro&Nano** Scientific Society

Deadline: July 30th 2011

Syllabus

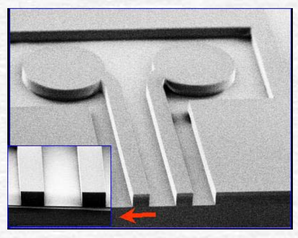
Section 1: Principles of biochemistry, cell biology, microelectronics and MEMS
1.1: Nanotechnology and nanobiotechnology for Life Sciences
1.2: Principles of biochemistry and cell biology
1.3: Structure of biomolecules
1.4: Microelectronic devices and MEMS for biosensing

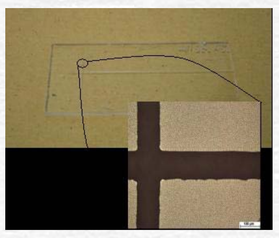
Section 2: Micro and Nano-fabrication science and technology
2.1: Conventional patterning schemes for bioanalytical microdevices
2.2: Microfabrication technologies for polymeric microfluidics
2.3: Patterning of biomolecules and other biological substances

Section 3: Bioanalytical Methods, Imaging, and Applications
3.1: Unraveling the proteome: Technologies, Applications, Challenges
3.2: Proteome Analysis using Mass Spectrometry
3.3: Scanning Probe Microscopy in Nanobiotechnology

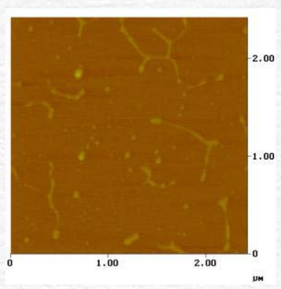
Section 4: Towards bioanalytical LOC devices and systems
4.1: DNA and Protein arrays: fabrication, detection and applications
4.2: Binding assays and Immunosensors
4.3: Integrated Biosensing Devices

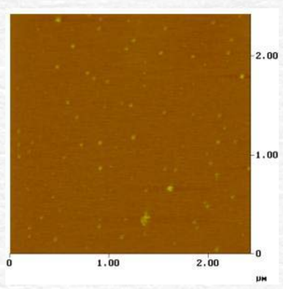
Laboratory 2.1: Fabrication of microfluidic devices on plastic substrates by soft lithography and deep polymer plasma etching
Laboratory 2.2: Fabrication of protein microarrays using lithography
Laboratory 2.3: Fluorescence detection of protein arrays
Laboratory 3.1: Protein separation by two-dimensional electrophoresis
Laboratory 3.2: Protein identification by Mass Spectrometry
Laboratory 3.3: Fabrication of protein microarrays using nanoplotter
Laboratory 3.4: Bioinformatics basic theory & laboratory
Laboratory 3.5: State of the art fluorescence imaging & confocal microscopy of biological samples
Laboratory 3.6: Drug inclusion in cyclodextrins: monitoring in situ by NMR spectroscopy, X-ray diffraction characterisation of drug inclusion and 3-D visualisation
Laboratory 4.1: Demonstration of a capillary fluoroimmunosensor
Laboratory 4.2: Operation of a lab-on-a-chip optical device using model assays and real time measurements



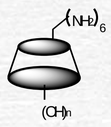


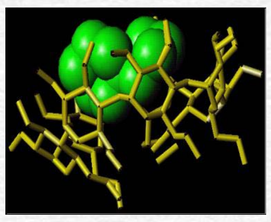
PMMA Capillaries

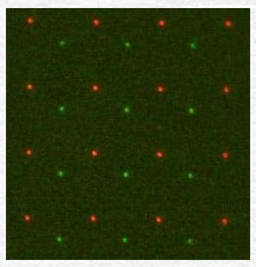




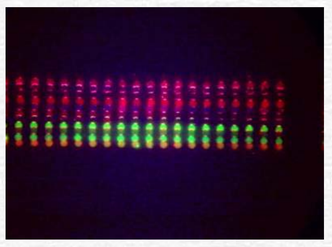
Atomic Force Microscopy
Formation of DNA nanoparticles of ~40 nm diameter





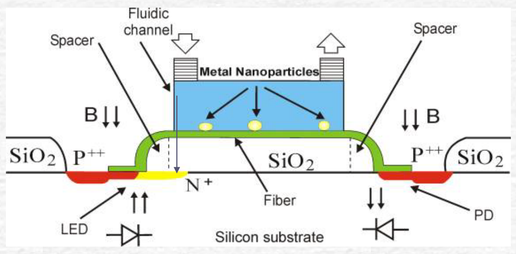


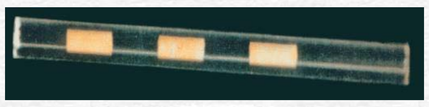
Fluorescence picture of the rabbit γ-globulins and biotinylated-BSA spot arrays after a 2 h immunoreaction with a mixture of AF 546 labeled streptavidin (red spots) and AF 488 labeled anti-rabbit IgG antibody (green spots). The spot size is approximately 4 μm.



Twelve rows of different protein spots fabricated in 12 succesive lithographic steps

Monolithic silicon optocouplers





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