

Nanotechnology of biosurfaces

SENIOR SCIENTISTS:

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Research Field and Subjects

The research activity deals with nanobiotechnology, i.e. the design and investigation of biological systems on the nanometer scale. This includes the control of interactions between living cells and their environment, the creation of nanobiomimetic structures by self-assembly and by scanning probe devices, the manipulation of single biomolecules and the development of high-sensitivity biosensors.

Recent achievements concern:

1. The elaboration and, or characterization of materials surfaces (polymers, metals, adsorbed layers) with properties (topography, chemical composition) controlled on the μm -nm scale;
2. The supramolecular organization of adsorbed proteins and its dependence on substratum properties and processing factors;
3. The supramolecular organization of supported lipid membranes;
4. The development of methods and the modification of AFM probes to investigate the surface properties (relief; electrostatic, macromolecular, specific interactions; mechanical properties) of microbial cells on the nanometer scale.

The following topics are currently addressed:

1. Structure and interactions of biomolecules at solid surfaces: adsorbed proteins, self-assembled monolayers, grafted layers, single molecule experiments.
2. Nanoscale properties of lipid membranes: molecular organization of mixed monolayers and bilayers, physical properties and molecular interaction forces using functionalized AFM tips, drug-membrane interactions, biomedical applications.
3. Surface properties of living cells at the nanometer level: visualization of surface ultrastructure, real time analysis of dynamic processes, mapping of physical properties, single molecule force spectroscopy, design and use of chemically and biologically functionalized AFM tips.

Products and Services

- ▶ Nanofabrication of biointerfaces
- ▶ Nanocharacterization of biointerfaces
- ▶ Chemical composition of surfaces
- ▶ Wetting properties of surfaces
- ▶ Electrical properties of surfaces

Main Equipment

- ▶ Atomic force microscope (AFM)
- ▶ X-ray photoelectron spectrometer (XPS)
- ▶ Langmuir-Blodgett
- ▶ Microelectrophoretic measurements
- ▶ Streaming potential measurements
- ▶ Wetting measurements
- ▶ Cell adhesion devices

Representative References

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Partnership

- NANOWAL
- CERMIN-UCL
- ISV-UCL

STAFF

Total: 17

KEY WORDS FOR R&D

bioadhesion
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biosensors
biosurfaces
drugs
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microbiology
nanobiomimetic, devices
nanobioscience
nanobiotechnology
nanocharacterization
proteins, adsorption
self-assembly
surfaces, cells

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