

From Bio- to Nano-Interfaces

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Synthetic nanoscale objects are increasingly used as carriers, markers or reporters in nanomedicine. The surface properties of these nano-objects largely determine how they interact with biological material as well as their fate in living organisms. In nature, nanoscale bio-objects such as proteins present a complex surface structure composed of hydrophobic and hydrophilic patches closely packed. To date little is known on the fundamental interfacial properties that such packing determines.

In this talk, I will show how atomic force microscopy can be used to probe locally the interface between complex, laterally heterogeneous surfaces and liquid. I will draw parallels between results obtained on model membrane proteins and metallic nanoparticles coated with a mixed monolayer of dissimilar organic molecules. I will discuss the importance of hydrophilic/phobic nanometer size domains to modulate interfacial properties and show that nanoparticles can be used as model compound to mimic biological entities (e.g. as cell penetrating peptides, as nano-enzymes, etc.).