Nano Life Science Institute (WPI-NanoLSI) Open Seminar

Proteins at Interfaces: The interplay between protein-protein and protein-substrate interactions

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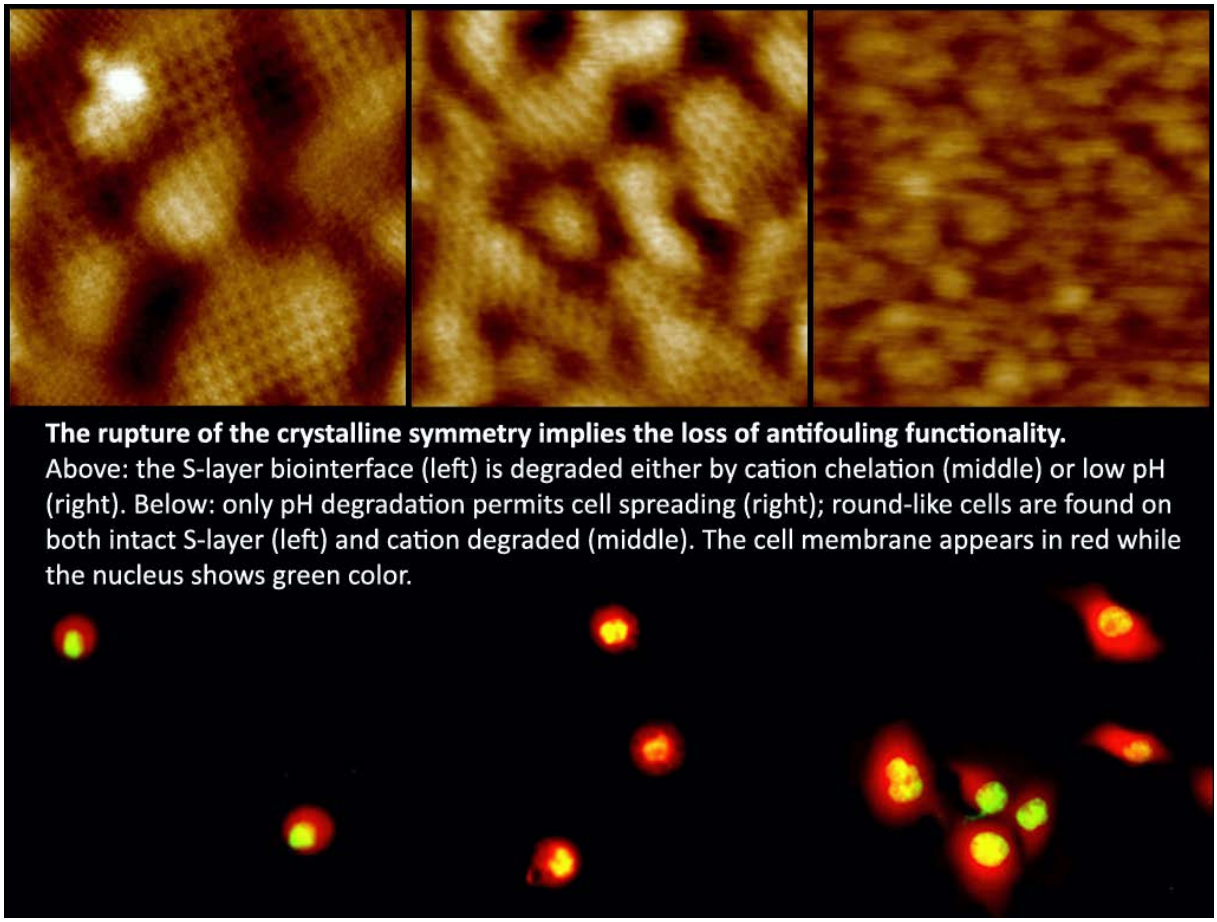
Abstract

Interactions of molecules at interfaces are the trigger factor of several biological processes such as protein adsorption, protein binding, or protein self-assembly. The interplay between protein-protein and protein-substrate interactions appears as the key-factor for the correct understanding of such phenomena. In this context, Atomic Force Microscopy (AFM) emerges as a powerful method for the *in situ* study of the protein behavior, the determination of the physical and chemical properties of proteins, or their (nano)manipulation.

In this talk, AFM will extensively explore the performance and the properties of bacterial surface layer proteins (S-layer) at interfaces. These proteins are the fundamental component of the cell envelope in archaea and bacteria, being their major potential the ability of self-assembling on almost any kind of surface, thus forming a 2D protein crystal layer of only a few nanometers thick. Results concerning the influence of protein concentration, observation time, and surface chemistry of the substrate in the protein recrystallization will be explained. In addition, some (bio)technological applications will be discussed. Finally, further experiments and the creative use of the AFM for studying softmatter will be presented.



The rupture of the crystalline symmetry implies the loss of antifouling functionality.
Above: the S-layer biointerface (left) is degraded either by cation chelation (middle) or low pH (right). Below: only pH degradation permits cell spreading (right); round-like cells are found on both intact S-layer (left) and cation degraded (middle). The cell membrane appears in red while the nucleus shows green color.