Antimicrobial agents, where do they bind, how do they act? Analysis at the nanoscale

Sofiane El-Kirat-Chatel

CNRS – University of Bordeaux

Institute of Chemistry & Biology of Membranes & Nano-objects (CBMN)

Bordeaux, France

sofiane.elkirat@u-bordeaux.fr

In the last two decades, atomic force microscopy (AFM) has emerged as an attractive tool to determine the physico-chemical properties of biological samples. The possibility to operate in physiological conditions is a major advantage of this technique as it allows, *e.g,* to follow changes upon exposure to external stresses. During this presentation, I will briefly present the different AFM modalities we are using (imaging, single-molecule force spectroscopy and single-cell force spectroscopy) to study the impact of antimicrobial agents. I will illustrate the advantage of our approaches through examples on: i) the effect of caspofungin, an antifungal lipopeptide, on yeast cells; ii) the action of squalamine, a steroid-polyamine with a spermidine motif, on the pathogenic bacteria *Staphylococcus epidermidis*; and iii) the specific recognition of *Staphylococcus aureus* by phages. The combination of multi-scale tools offers the possibility to determine the impact of external stresses from the molecules to the microbial suspension and to explain phenotypes observed upon cell treatments.