DISTINGUISHED LECTURE in BIOLOGICAL ENGINEERING

“Chiral Sum Frequency Generation Spectroscopy for Protein Characterization at Interfaces”

Monday, October 22, 2018, 12h15
EPFL – room SV1717

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Host: Prof. Sylvie Roke

Abstract:
Characterization of protein secondary structures at interfaces in situ and in real time is important to understand biological processes associated with cell membranes and solve problems in various fields of biomedical sciences. However, such characterization is challenging because it requires methods that are both selective to interfaces and protein secondary structures. We demonstrate that chiral sum frequency generation spectroscopy (SFG) can provide peptide amide I and N-H stretch vibrational signals that are free of water background and characteristic to parallel beta-sheet, anti-parallel beta-sheet, alpha-helix, 3-10 helix and disordered structures, enabling chiral SFG to distinguish protein secondary structures at interfaces, similar to circular dichroism spectroscopy for protein characterization in solution. Using chiral SFG, we monitored misfolding of an amyloid protein, characterized protein orientation at interfaces, developed new methods for probing proton exchange in proteins, and studied two-dimensional crowding effects on protein folding at interfaces. These studies demonstrate chiral SFG as a new spectroscopic tool for characterizing protein structures and functions at interfaces, which can be used to address a wide range of fundamental and engineering problems.

Sandwiches will be provided

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