Amino acids adsorption at Ag surfaces: the bio-interface at the nanoscopic level.

L. Savio.
IMEM-CNR - Genova (Italie)

Self-assembly and hierarchical organization of (bio)-organic molecules at surfaces is a key issue in nanoscience and nanotechnology because of the applications of the hybrid organic-inorganic interfaces foreseen in the fields of molecular electronics, sensoristics, pharmacology, bio-compatibility, hygiene and bio-fouling. In this frame, amino acids play a key role since they are the basic constituents of peptides and proteins and are simple enough to bring information at the molecular level on the chemical interaction with the surface. They are therefore among the most used molecules in fundamental studies aiming at the fundamental characterization of the hybrid organic-inorganic interface [1]. In this talk, I will present our results on glutamic acid and cysteine adsorption at Ag surfaces. By combining microscopic and spectroscopic techniques with density functional theory calculations, we can describe the self-assembly of glutamic acid molecules on different Ag substrates [1] with an unprecedented level comprehension. Particular attention is given to the determination of the chemical state of the adsorbed molecules, to the identification of the observed geometries and to the understanding of the self-assembly mechanism [2,3]. Indeed, both glutamic acid (see figure1) and cysteine layers organize on Ag surfaces in different phases depending on surface temperature, suggesting the existence of several local minima in the energy diagram of these systems [4]. The peculiarities introduced by the weak interaction with a poorly reactive substrate as well as the role of the different functional groups in the self-assembly process are critically discussed by comparison with literature cases. A perspective on the interaction of the same molecules with less reactive, non-metal substrates is also given through preliminary spectroscopic results.

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References
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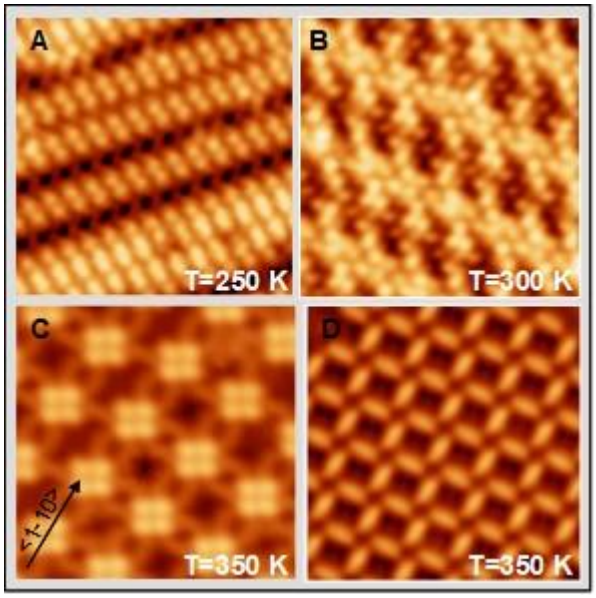
Self-assembled geometries of Glu on Ag(100)


A
T=250 K
B
T=300 K
C
T=350 K
D
T=350 K