Mechanisms of sulphate adsorption on vicinal Cu(111) surfaces – A combined EC- SPM investigation

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Nowadays, the application of methods for preparing surfaces, and studying their interaction with adsorbates of atomic or molecular resolution is a hot topic that opens to new fundamental insights and experimental potentialities. Nevertheless, systematic studies on the so-called nano-electrochemistry (i.e., the influence and even the processes related to nanometric structures) are still missing.

In this talk, we explore the interplay between the adsorption of sulphate anions and nanostructures, i.e. the presence of steps, on vicinal Cu(111) surface. From electrochemical scanning tunneling microscopy (EC-STM) investigation on a flat Cu(111) surface it is known that sulphates adsorption leads to the formation of a long-range ordered Moiré-superstructure accompanied by the appearance of small copper islands. The same Moiré pattern forms on vicinal Cu(111) surfaces, following different growth mechanisms. If the terrace's width is significantly smaller than the structural Moiré-unit, the terrace's width is widened involving a movement of the step edges, but no islands formation. If the terraces are wider than the Moiré-unit, the step edges remain basically unaffected but islands are formed on the terraces (as on the flat Cu(111) surface). Thus, the stability of the vicinal copper surfaces against the electrochemical "attack" of sulphate anions depends on the steps density, i.e. on the vicinal angle.

REFERENCE:

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