Metal and Semiconductor Electrodeposition: Ultra Thin Films and Nanowires

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During the last decade, various investigations have been performed on the nanoscale electrodeposition of metals and compound semiconductors from aqueous electrolytes, in particular, of coinage metals and II-VI semiconductors. By employing ionic electrolytes, the range of these materials can be extended significantly including transition metals and elemental semiconductors.

In this contribution we present two such examples of recent *in situ* electrochemical SPM measurements on the nanometer scale electrodeposition from ionic liquids at room temperature. One is on the electrodeposition of Ti nanowires which nucleate and form at HOPG step edges and exhibit a narrow size distribution of ~10 nm width, ~1nm height and a length given by the HOPG step edge. The second example deals with topography and electronic structure of ultrathin Ge films deposited on Au (111) and Si (111), respectively. A thickness induced metal-insulator transition occurring in the thickness range 1-10 nm was first reported recently [1]. This will be discussed in more detail on the basis of new results.

[1] W. Freyland et al, Electrochimica Acta, 2002 (submitted)