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Electrodeposition and electrocatalytic properties of Pt-Au overlayers

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Bimetallic nanostructures represent a promising route to modifying the electronic and geometrical properties of catalysts, while lowering the noble metal content. A recent method for achieving atomic scale controlled growth of noble metal is known as the Surface Limited Redox Replacement Method (SLRR) [1]. The SLRR method has been successfully applied to the deposition of Pt overlayers on Au, using a Cu [1] or Pb [2] UPD layer as a sacrificial template.

Nanoscale platinum and gold are systems of current interest as powerful catalysts relevant in many fuel cell reactions [3, 4]. In this work, we will present the optimization of this method in single cell configuration using Pb UPD to design ultra-thin overlayers of Pt and Au. The potential dependence of the coverage of Pb UPD on Pt has been studied by cyclic voltammetry, chrono-amperometry and electrochemical quartz crystal microbalance (EQCM). The developed bimetallic structures have been analyzed by electrochemical, STM, EDX and X-ray diffraction methods. The dependence on the electrooxidation of CO with Pt and Au thickness has also been determined.

References:

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