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Activity and durability of Pt films during Formic acid oxidation

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In recent years growth of high quality Pt thin films and Pt- monolayer catalysts via Surface Limited Redox Replacement (SLRR) using sacrificial underpotentially deposited (UPD) metal layer has been explored by several research groups [1-3]. Our recent work demonstrated highly controlled Pt thin films growth by SLRR using Pb UPD layer in one-cell configuration [4]. The results showed uniform, quasi-2D Pt films growth with roughness that does not change with the number of SLRR cycles mostly attributed to the Pb -Pt replacement stoichiometry, the coverage and the atomic size mismatch of the Pb UPD layer.

Here in this work, we present catalytic behavior during formic acid oxidation reaction of accordingly deposited Pt films. Although most of the earlier studies have been devoted to measurements of the initial activity of Pt catalysts, very little is known about their long term durability [5-7]. Therefore, we have studied the activity changes and the durability of Pt films during formic acid oxidation. We focused on the effect of film thickness and potential limits. The behavior and morphology of Pt films during the dissolution were examined by electrochemical techniques and Atomic Force Microscopy (AFM).

References

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