Evolution of Au(111) electrode surface in different electrolytes and conditions studied with a home-made EC-STM

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Propositions

Accompanying the thesis:

“Evolution of Au(111) Electrode Surface in Different Electrolytes and Conditions Studied with a Home-made EC-STM”

1. Seeking shortcuts is unavoidable when designing and manufacturing of a complex and sensitive instrument during a PhD program. (**Chapter 2**)
2. The Au(111) surface in sulfuric acid is not static in the double layer potential window: applied delays in the double layer window smoothen the surface when roughened previously. (**Chapter 3**)
3. The inverse correlation between Au(111) surface roughness and oxidation charge density during Oxidation-Reduction Cycles (ORCs) highlights terrace-dominated electrochemical processes. (**Chapter 3**)
4. Chloride concentrations as low as 1 µM in 0.1 M sulfuric acid cause inhomogeneous roughening on Au(111) while higher concentrations cause rapid gold dissolution. (**Chapter 4**)
5. Roughening, dissolution, and remaining intact are the local responses of Au(111) surface in 0.1 M perchloric acid. (**Chapter 5**)
6. The integration of machine learning with ECSTM experiments will be revolutionary to recognize surface defects, tip effects, and optimize experimental conditions.
7. Fundamental studies of Au(111) roughening under different electrochemical conditions are crucial for designing stable electrochemical systems like fuel cells and electrochemical sensors.
8. In-situ scanning probe microscopy is essential for capturing the inhomogeneous roughening of Au(111) caused by impurity-driven processes.
9. Jumping into conclusions based on the surprising results during the EC-STM experiments should be avoided. Data analysis and comprehensive discussions are essential before drawing conclusions.
10. Publishing of not-fully understood ECSTM results (possibly with some inherent surface defects) help the scientific community significantly.

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