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Platinum electrochemistry through a magnifying glass

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Propositions

Accompanying the thesis

“Platinum Electrochemistry through a magnifying glass”

1. Either data from electrochemical scanning tunneling microscopy (EC-STM) or cyclic voltammetry experiments alone cannot fully describe the roughening of a Pt(111) electrode.
Chapters 2 and 3
2. A quantitative analysis of EC-STM data can, when correlated to the electrochemical signals, provide detailed information on the *in situ* electrode surface structure.
Chapters 2 and 3
3. Although time-consuming, voltammetric scanning electrochemical cell microscopy is a very powerful electrochemical imaging technique, which has the ability to resolve differences in reactivity that would otherwise remain unnoticed.
Chapter 4
4. The limited possibilities to prepare clean and reproducible ultramicroelectrode surfaces severely affect the applicability of such electrodes.
Chapter 5
5. Literature contains a zoo of preparation methods for (atomically) sharp metallic probes. However, considering the bad reproducibility, many researchers would benefit from a systematic validation of these recipes.
6. It is not at all trivial to perform proper electrochemical measurements in complicated setups. Too many studies remain vague on these complications, whereas in fact they might be comparing apples to oranges.
7. Wolfgang Pauli's statement: *“God made the bulk; surfaces were invented by the devil”* captures the complexity of interfacial processes. However, it is exactly at those diabolical interfaces where the most interesting chemistry occurs.
8. Microscopy techniques often lead to attractive data visualizations, but it is the level of detail in the analysis beyond the fancy images that distinguishes scientists from artists.
9. Universities generate a wealth of new knowledge, often enabled by expensive experimental setups. Unfortunately, the lack of systematic investments in personnel means that much of this knowledge is only short-lived.
10. The ability to function well after a serious lack of sleep is a useful quality for performing successful scanning probe microscopy experiments.