

IPID4all Doctorate Research Exchange with University of Oldenburg

Feedback report

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Nanoporous gold as a model catalyst*

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Introduction

Synthesis and characterization of different types of microelectrodes, is the first and arguably most important step in setting up a successful SECM experiment. In order to explore a potentially interesting material, as for example nanoporous gold, an experimental way of creating this material in a useable form must be established. For this purpose different approaches such as etching and dealloying have been investigated.

Research Undertaken

Perfecting the process of producing gold microelectrodes, their electrochemical and optical characterization.

Exploration of etching times, and potentials applied for pure gold microelectrodes. Chemical dealloying methods of a silver/gold alloy.

Application of the mentioned microelectrodes in SECM measurements.

Personal Experience

Crafting microelectrodes, CV interpretation and electrochemical characterization, confocal microscopy, setting up a SECM experiment and perfecting the geometry, solvents, scan rates, potentials applied and other.

Conclusions

Both approaches of creating nanoporous microelectrodes have shown promise, although both have some shortcomings that are difficult or impossible to avoid. The dealloyed material is prone to having impurities in the form of silver resulting in unpredictable electrochemical behaviour. The geometry of etched electrodes heavily relies on the preparation methods, and is extremely difficult to characterize and predict. Having the mentioned difficulties in mind, both materials have shown promise to be a system whose electrochemical behaviour in methanol fuel cells can be investigated with SECM.

GEFÖRDERT VOM

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