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Promotion of the Electrocatalytic Reduction of Nitrate

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Title: Promotion of the electrocatalytic reduction of nitrate

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Propositions

accompanying the thesis

Promotion of Electrocatalytic Reduction of Nitrate

1. The use of nitrate is a part of modern history of human civilization.
2. The electrochemical reduction of nitrate on electrode surface is always focused as the mechanism by which volatile products are formed. However, the chemical interactions between intermediates that are resulted from nitrate reduction shall be noticed as a potent pathway.

Chapter 2 of this thesis

3. The theoretical calculation sometimes can help to answer questions that people could not do about the reasons why this is the experiment result.

Chapter 3 of this thesis

4. During the research of electrocatalysis, we are actually doing both electrochemistry and analytical chemistry at the same time.

Chapter 4 of this thesis

5. Although Sn enhances the nitrate adsorption on electrode surface, Pt still plays an important role on steering the reduction pathway with a specific selectivity to volatile and nonvolatile products.

Chapter 2 and 4 of this thesis

6. For the activity of nitrate reduction, there is an optimal condition about surface coverage of modifier where activity achieves the most, which could be due to the balance of the roles between Pt and modifier. Thus, the more is not always the better.

Chapter 2 and 3 of this thesis

7. Besides the catalytic nature of the working electrode, solution pH is a critical factor that can mediate the electrocatalytic activity of surface reactions, and also help a lot to understand the catalytic effect of the electrode material and the reaction pathway.

Chapter 5 of this thesis

8. Nitrate sometimes can be used as a probe, to promote the understanding of catalysis on surface.

9. Whatever you do, work at it with all your heart.

- Colossians 3:23

Jian Yang

Leiden, October 24, 2013