



Universiteit
Leiden
The Netherlands

Electroreduction of nitrate and carbon dioxide on copper electrodes: a mechanistic study

Perez Gallent, E.

Citation

Perez Gallent, E. (2018, February 1). *Electroreduction of nitrate and carbon dioxide on copper electrodes: a mechanistic study*. Retrieved from <https://hdl.handle.net/1887/61142>

Version: Not Applicable (or Unknown)

License: [Licence agreement concerning inclusion of doctoral thesis in the Institutional Repository of the University of Leiden](#)

Downloaded from: <https://hdl.handle.net/1887/61142>

Note: To cite this publication please use the final published version (if applicable).

Cover Page



Universiteit Leiden



The following handle holds various files of this Leiden University dissertation:

<http://hdl.handle.net/1887/61142>

Author: Perez Gallant, E.

Title: Electroreduction of nitrate and carbon dioxide on copper electrodes: a mechanistic study

Issue Date: 2018-02-01

Propositions (stellingen)

Accompanying the thesis

Electroreduction of nitrate and carbon dioxide on copper electrodes. A mechanistic study

1. It is remarkable that hydrocarbons are produced from electrochemical reduction of CO₂. *Y. Hori, K. Kikuchi, A. Murata and S. Suzuki, 1986, 15 (6), 897-898*
2. Elucidation of the reaction mechanism of CO/CO₂ reduction to C₂ species is not trivial. A possible way of simplifying the problem is to analyse separate reactions involving fewer proton-electron transfers.
Chapter 3 of this thesis
3. The barriers for ethanol formation during CO₂ reduction can be lowered by making use of the structure sensitivity of the reaction.
Chapter 3 of this thesis
4. OCCOH is a stable intermediate formed after the first hydrogenation of CO on Cu(100).
F Calle-Vallejo, MTM Koper, Angewandte Chemie, 2013, 52 (28), 7282-7285.
5. The C-C coupling to C₂ species on Cu(100) takes place through a reductive dimerization step at the early stages of the reaction mechanism.
Chapter 4 of this thesis

6. CO-CO coupling is facilitated on Cu(100), (111) and (211) by the presence of a cation-induced electric field in the Helmholtz plane, with the lowest barrier on Cu(100).

R. B. Sandberg, J. H. Montoya, K. Chan, J. K. Nørskov, Surface Science, 2016, 654, 56-62

7. Depending on the cation size, the C₂ pathway is blocked by the enhancement of the C₁ pathway, so that larger cations enhance the selectivity towards ethylene over a wider potential range.

Chapter 5 of this thesis

8. In contrast to the model that proposes that larger cations decrease the pH near the electrode and therefore serve as buffering agents, cations are essentially catalytic promoters. Their presence alters substantially the free-energy landscape of CO reduction.

Chapter 6 of this thesis

9. In scientific research, it is often forgotten that negative results may also be very important and that relevant discoveries may be behind it.

10. Rice with shrimps, peas and chorizo it is not paella. It is just rice with stuff.

Elena Pérez Gallent