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Biomimetic models of [NiFe] hydrogenase for electrocatalytic hydrogen evolution

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Propositions (Stellingen)

Accompanying the thesis

Biomimetic Models of [NiFe] Hydrogenase for Electrocatalytic Hydrogen Evolution

1. Altering the backbone spacer of chelating ligands changes the electrocatalytic properties of the corresponding metal complexes.
This thesis, Chapter 2
2. Unexpected results can give a new perspective and lead to the investigation of a different research subject.
This thesis, Chapter 4
3. The different physical properties of sulfur and selenium do not have a significant effect on the electrochemical properties of the complexes with ligands that only differ in these donor atoms.
This thesis, Chapter 3 and 5
4. Irreversibility of reduction processes makes the understanding of electrocatalytic reactions difficult.
This thesis, Chapter 3 and 5
5. A difference of nearly 1 V between the reduction potentials of the thiolate and selenolate analogues of the complexes with a propyl spacer is not expected if the reduction potentials of the thiolate and selenolate analogues of the complexes with a xylyl spacer are the same.
Weber et al., Eur. J. Inorg. Chem. 2014, 148-155; This thesis, Chapter 2

6. One cannot state that a compound is active in electrocatalytic proton reduction without reporting the results of the appropriate blank experiments.
Wombwell et al., Chem. Eur. J. 2015, 21, 1-10 and Weber et al., J. Am. Chem. Soc. 2012, 134, 20745-20755
7. Although cyclic voltammetry can be a very important tool to check the electrochemical activity of a compound, reporting a complex to be an excellent catalyst without any quantification of the results is not useful.
Yang et al., Eur. J. Inorg. Chem. 2015, 2965-2973
8. As nickel-ruthenium complexes generally are more stable than the corresponding nickel-iron complexes, they should be considered as alternatives in the design of new electrocatalysts for dihydrogen production.
Canaguier et al., Chem. Eur. J. 2009, 15, 9350-9364; This thesis Chapter 5
9. Time flies when you are in the lab but it stops when you are writing.
10. Preparing a suitable and reliable setup for GC measurements is more difficult than synthesizing a new catalyst.

Gamze Gezer
Leiden, October, 2017