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Cathodic corrosion

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PROPOSITIONS

accompanying the thesis:

Cathodic Corrosion

1 Cathodic corrosion is anisotropic and starts at mild potentials, which are very close to the equilibrium potentials of hydrogen evolution and CO₂ reduction.

(Chapter 2, 3 and 4 of this thesis)

2 The cathodic corrosion of Pt, Rh and Au likely occurs through the formation of ternary metal hydrides like Na₂PtH₆.

(Chapter 4 and 5 of this thesis)

3 Cathodic corrosion can be used to shape catalysts and tailor them for specific chemical reactions.

(Chapter 4 and 6 of this thesis)

4 When combining cathodic and anodic corrosion to create alloy nanoparticles, one should always ensure that the produced nanoparticles possess the expected structure and composition.

(Chapter 7 of this thesis)

5 Noble metals can form unexpected compounds under cathodic polarization. These compounds are generally not included in Pourbaix diagrams.

(Inspired by: 'Ghilane, J. *et al.*, J. Phys. Chem. C **111**, 5701-5707 (2007)' and 'Simonet, J., Electrochem. Comm. **75**, 67-70 (2017)')

6 As a true branch on the tree of physical chemistry, electrochemistry flourishes when experiments are joined with appropriate theoretical and mathematical models.

(Inspired by: 'Anderson, R. M. *et al.*, *Acc. Chem. Res.* **48**, 1351-1357 (2015)' and 'Friedrich, B., *Angew. Chem. Int. Ed.* **55**, 5378-5392 (2016)')

7 In scientific writing, one should refrain from umbrella terms like 'green', 'efficient', 'sustainable' and 'clean', unless the intended meaning of these words is clearly defined within the text. Such vague terms are neither in the interest of the reader, nor of the larger scientific community.

(Inspired by: 'Scott, S. L., Jones, C. W., *ACS Catalysis* **7**, 2218-2219 (2017)')

8 As scientists, we should not just report data accurately, but also structure our reports along a clear and compelling narrative. Otherwise, our reports may go unread or be misinterpreted, *de facto* being as impactful as unwritten reports.

(Inspired by: 'Olson, R., *Houston: We Have a Narrative* (University of Chicago Press), 2015')

9 The most subtly layered and balanced beer is brewed by combining complementary ingredients. Likewise, the most insightful and well-rounded science is conducted by combining complementary techniques and scientists.

10 Sometimes, the most productive work decision is to take a rest.