Selectivity and competition between the anodic evolution of oxygen and chlorine

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Propositions

accompanying the thesis

Selectivity and competition between the anodic evolution of oxygen and chlorine

1) The scaling relation between the activities of chlorine evolution and oxygen evolution prohibits the optimization of their selectivity via a purely kinetic approach.
Chapter 3 of this thesis

2) A rotating ring-disk electrode setup with a Pt ring can be used as a reliable and rapid tool for the detection of chlorine evolution, provided the solution pH is 1 or lower and that bubble formation due to excessive gas evolution is avoided.
Chapters 2 and 8 of this thesis

3) Bromide-related adsorption and oxidation processes, which may occur during seawater electrolysis, must be given due consideration within the context of water electrolysis, since they can significantly interact with both oxygen and chlorine evolution.
Chapters 4 and 5 of this thesis

4) Manganese oxide-coated electrodes are selective towards oxygen evolution because the manganese oxide component, which itself is not electrocatalytically active, selectively prohibits the diffusion of chloride to the catalytic interface buried underneath.
Chapter 6 of this thesis

5) Buried interfaces can selectively prevent chloride oxidation during oxygen evolution and are a promising approach to achieving chlorine-free seawater electrolysis.
Chapter 7 of this thesis

6) The academic research concerning electrocatalytic oxygen evolution suffers from a lack of interest in the effect of gas bubbles on the perceived reactions kinetics, as well as in long-term catalyst stability.

7) The mind, like a muscle, has a limited capacity for continued strenuous exercise. Trying to work endlessly without maintaining proper periods of rest and relaxation is neither healthy, nor productive, nor rational.

8) Drawing careful conclusions from a limited but corroborated set of measurement techniques is more valuable than barraging a problem with quasi-useful experiments and ill-related DFT calculations (a.k.a. 'proof by intimidation').
Zhao et al., Nat. Energy 2016

9) Many of the published descriptions of electrochemical procedures and results are significantly lacking in detail, especially in high-impact journals; additionally, negative outcomes are not readily accepted for publication. As long as this situation stands, scientific progress will be greatly hampered due to researchers constantly having to reinvent the wheel.

10) External variables such as air humidity, the genre of background music in the lab, or the phase of the moon, sometimes have a crucial influence on the outcome of electrochemical experiments.