CO2 reduction on post-transition metals and their alloys: an industrial approach

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PROPOSITIONS

accompanying the thesis:

CO_2 reduction on post-transition metals and their alloys: an industrial approach

i. Cathodic disintegration of Sn and Pb can be used to synthesize selective catalysts in a more clean, sustainable way.
(Chapter 3 of this thesis)

ii. Cathodic disintegration of Sn and Pb is likely to proceed through the electrochemical formation, and subsequent decomposition, of unstable Zintl phases.
(Chapter 4 of this thesis)

iii. Intermetallic compounds present a very interesting opportunity to modulate catalytic activity and should be studied systematically for electrochemical conversions of sustainable molecules.
(Chapter 2, 5 and 6 of this thesis)

iv. An electrocatalyst layer is a complex environment, composed of many different substances. Careful optimization of this layer has a profound effect on the performance of the system as a whole.
(Chapter 7 of this thesis)

v. Many energetically inefficient but otherwise appealing electrochemical reactions could be made economical not only by appropriate cell design, but by a smart pairing with remunerative and efficient reactions at the opposite electrode.
(Inspired by: Na, J. et al. *Nat. Commun.*, 2019, 10, 5193.)

vi. Cathodic corrosion of transition metals and cathodic disintegration of Sn and Pb point at the existence of novel, unexpected chemistries for metals under cathodic polarization. These phenomena need to be thoroughly studied to create a coherent understanding of the processes underlying them.

vii. The objective we want to accomplish by studying CO_2 reduction is already performed, for free, by the same trees we cut down to produce the paper on which we print books on CO_2 reduction, like this one.

viii. Learning how to talk to the people whose knowledge is complementary to yours can make the difference between success and failure in scientific research.

ix. If you are not understood, assume it is your fault. Then, explain yourself better.

x. Not all time is money.