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Presentation Title

Catalysis for sustainable energy: The challenge of harvesting and converting energy.

Abstract

For many decades to come we shall still rely on fossil resources and as new sustainable energy sources emerge there will be a need for averaging out the temporal variation. Both schemes will require extensive use of heterogeneous catalysts and the need for new electro- and photocatalysts will increase. In this presentation we will demonstrate a number of surface chemistry reactions, in which a combination of theoretical insight and interplay between experimental surface science on well-defined single crystal surfaces, model systems of nanoclusters deposited on planar surfaces, and measurements on supported catalysts have made identification of new catalyst possible [1]. Gaining fundamental insight allows for prediction power on what should be done in order to improve the catalytic activity and how we optimize their presence? Furthermore, we will also demonstrate that this principle can be extended to control selectivity and optimization of electrochemical reactions, for which we are exploring alternative catalyst for either reducing [2,3] or entirely replacing the scarce and expensive Platinum group catalysts [1,4].

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- [3] J. Greeley, I.E.L. Stephens, A.S. Bondarenko, T. P. Johansson, H. A. Hansen, T. F. Jaramillo, J. Rossmeisl, I. Chorkendorff, J. K. Nørskov, “Alloys of platinum and early transition metals as oxygen reduction electrocatalysts”, Nature Chemistry 1 (2009) 522.
- [4] Y. Hou, B. L. Abrams, P.-C.K. Vesborg, M. E. Björketun, K. Herbst, L. Bech, A. M. Setti, C. D. Damsgaard, T. Pedersen, O. Hansen, J. Rossmeisl, S. Dahl, J. K. Nørskov, and I. Chorkendorff, “Bioinspired Co-catalysts Bonded to a Silicon Photocathode for Solar Hydrogen Evolution” Nature Materials 10 (2011) 434-438.