

The Morphology and Reactivity of Model Catalysts Based on Cobalt Oxide

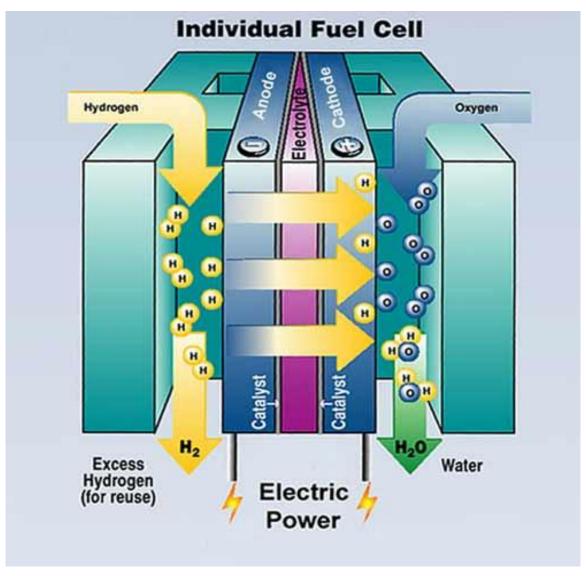
Mgr. Oleksandr Korbut Supervisor: Dr. Josef Mysliveček

Prague 2016

Contents

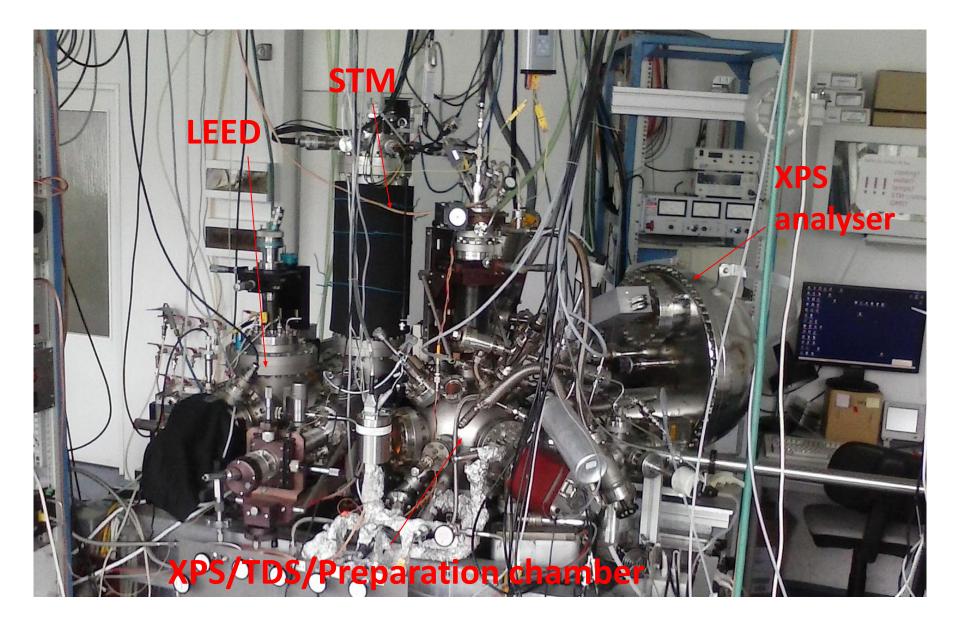
- Motivation
- Experimental methods to be applied
- Categories and types of catalysts
- Experimental project

Motivation



http://butane.chem.uiuc.edu/pshapley/Enlist/Labs/FuelCellLab/FuelCell.html

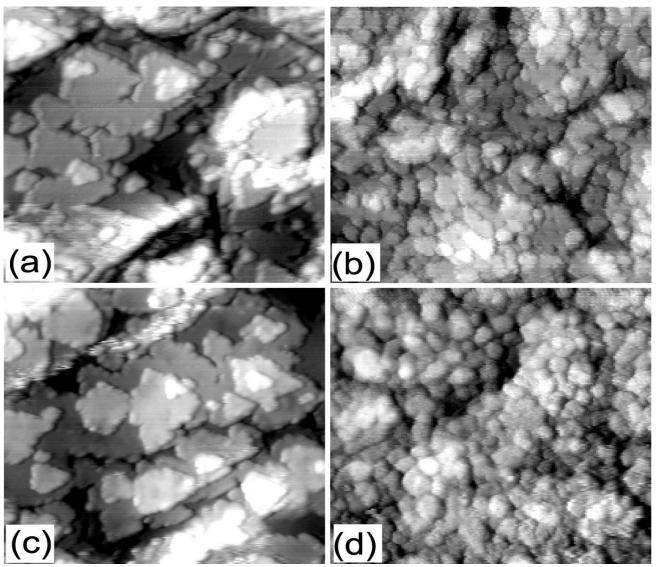
Experimental methods to be applied



Categories and types of catalysts

- Homogeneous vs heterogeneous
- Types of catalysts:
- Ceria-based catalysts;
- Pt-based catalysts;
- Co-based catalysts.

Ceria based catalysts



V. Matolín, I. Matolínová, F. Dvořák, V. Johánek, J. Mysliveček; et al. CATALYSIS TODAY, Volume 181, Issue 1, 12 February 2012, Pages 124-132

Pt-based catalysts

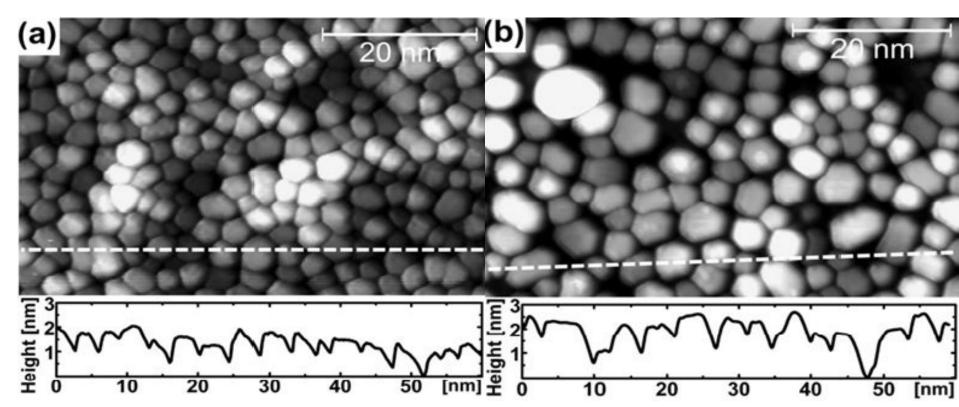
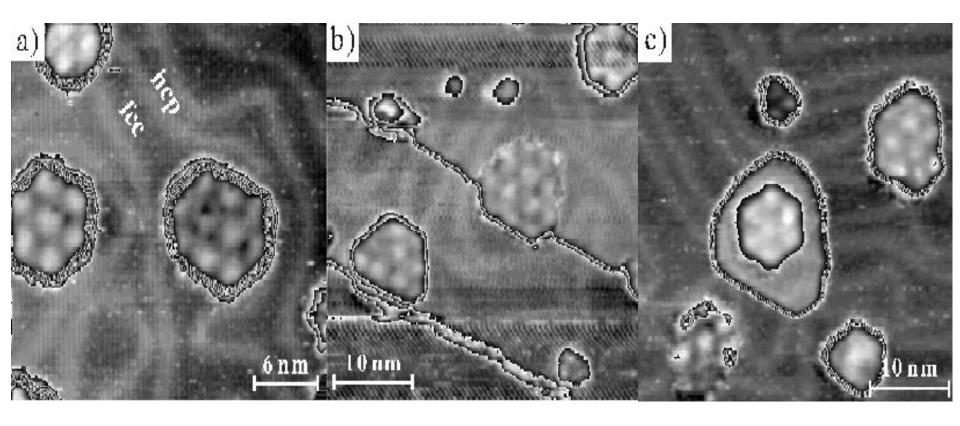


Image width: 60 nm. Tunneling parameters: (a) Us = 2.6 V, I = 0.4 nA and (b) Us = 2.5 V, I = 0.3 nA.

M. Happel, J. Mysliveček, V. Johánek; et al. JOURNAL OF CATALYSIS, Volume 289, May 2012, Pages 118-126

Co-based catalysts



M. Li and E. I. Altman. J. PHYS. CHEM. C, Volume 118 (24), May 2014, Pages 12706–12716

Our experimental project

- To establish experimental procedures for obtaining thin films of cobalt oxides CoO and Co3O4 with well-defined crystallographic orientation and a complete coverage on a suitable metal or oxide substrate.
- To obtain experimental control of the morphology, particularly the density of monoatomic steps, and of density of oxygen vacancies on the oriented continuous thin films of cobalt oxide.
- The measurement of reactivity towards H2O, O2 and methanol (CH3OH) on previously developed and quantitatively controlled model catalyst systems.

Thanks for your attention!