



CHARLES UNIVERSITY

# The Morphology and Reactivity of Model Catalysts Based on Cobalt Oxide

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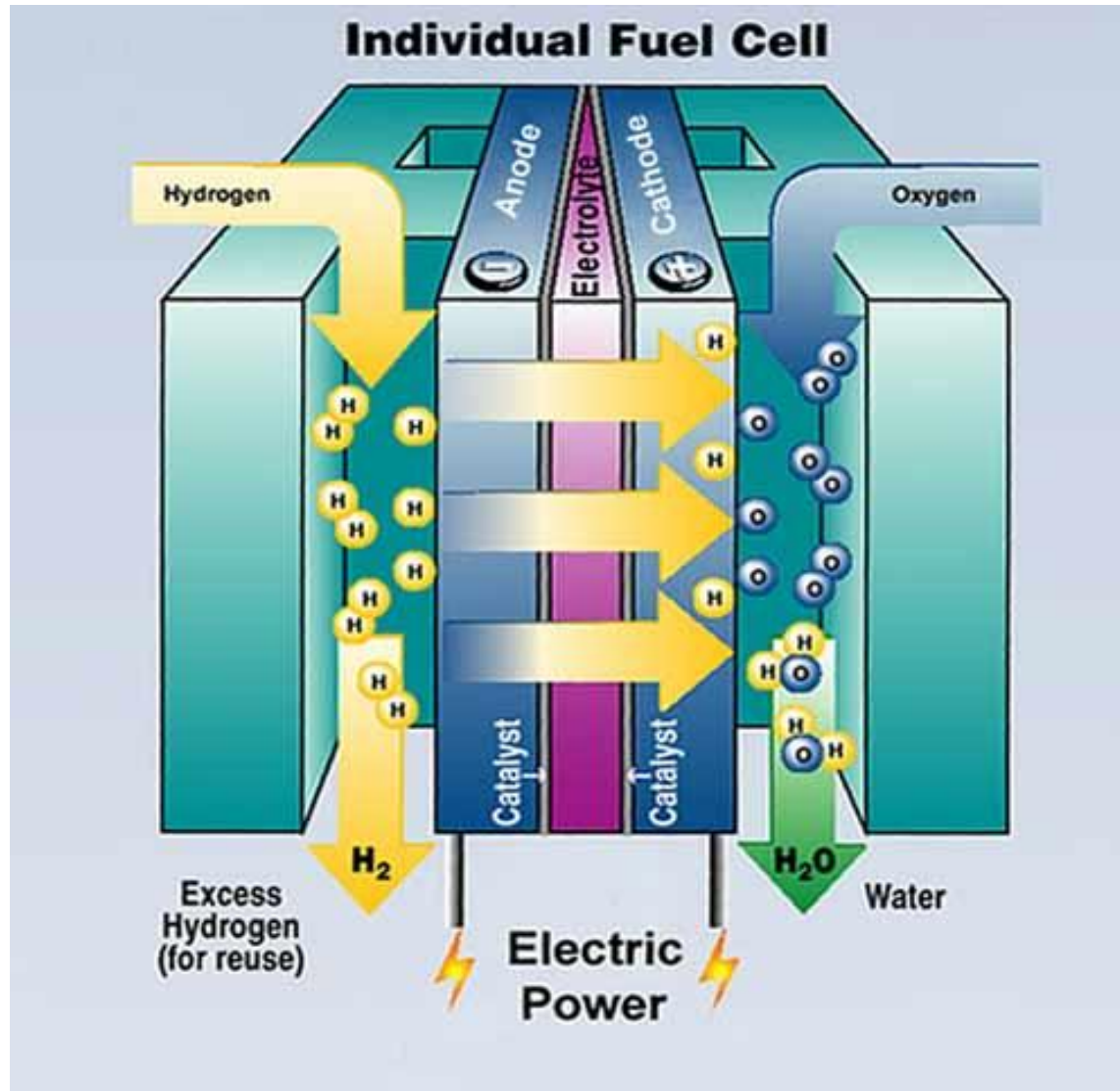
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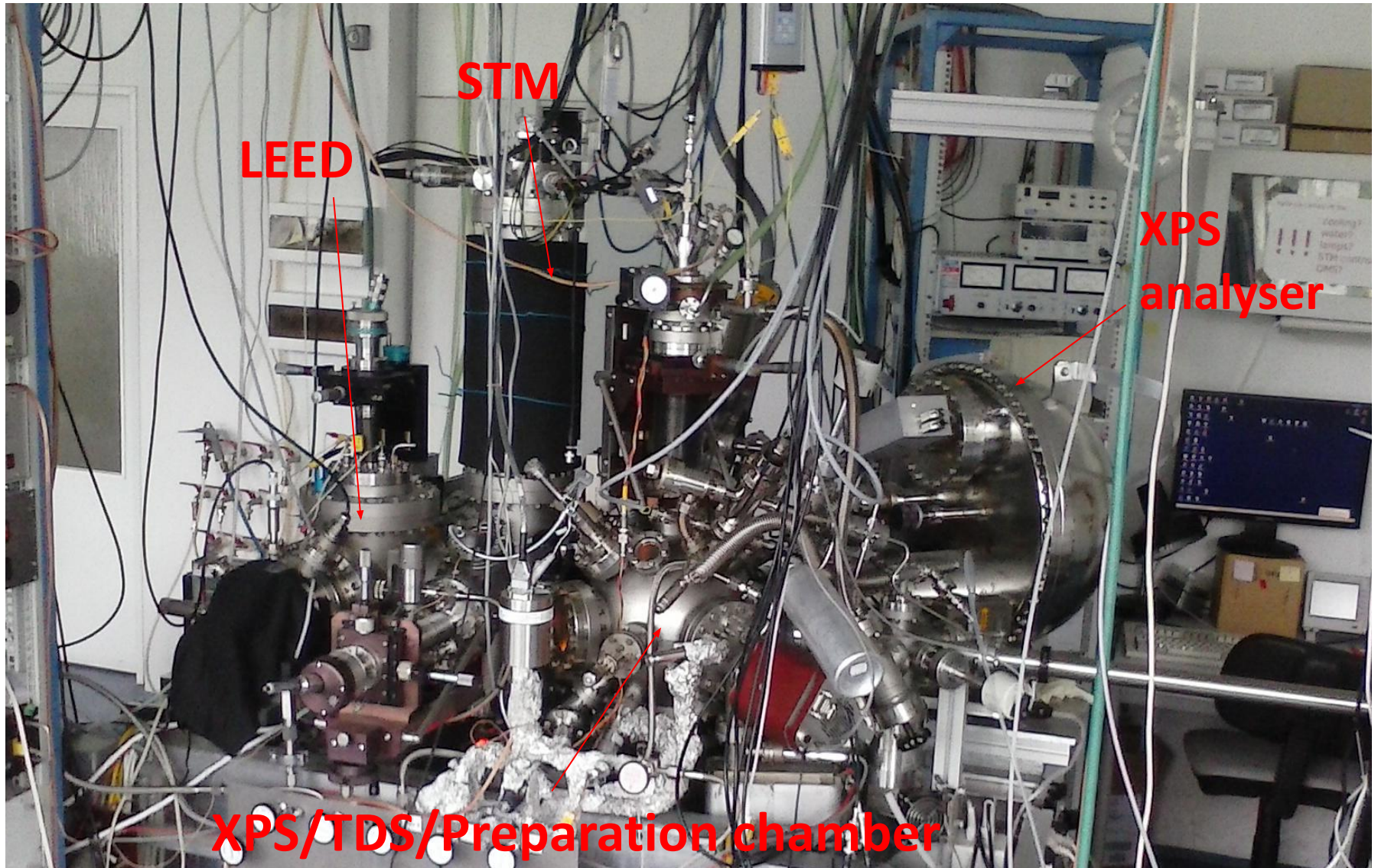
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# Motivation



# Experimental methods to be applied

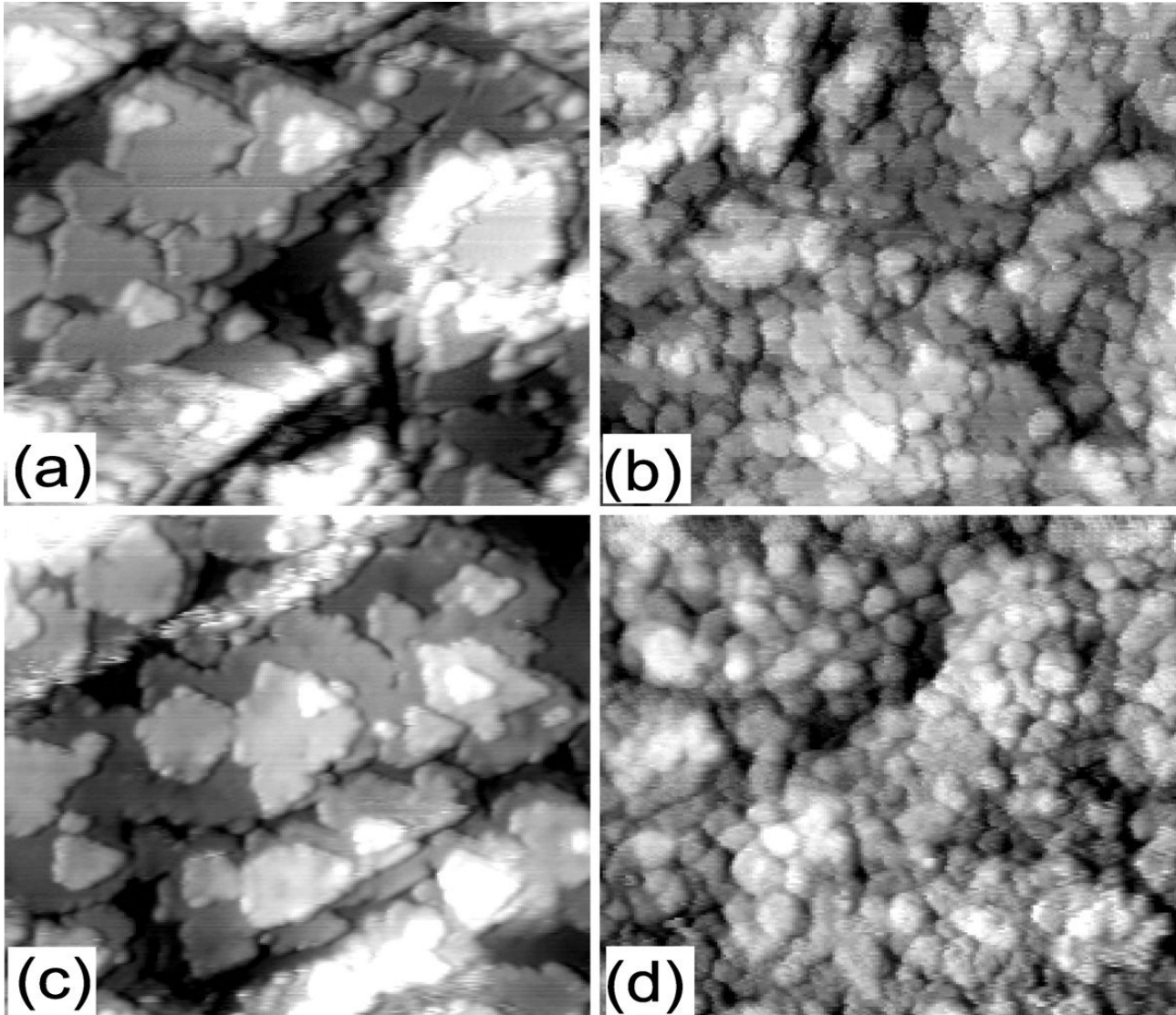


# Categories and types of catalysts

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



# Ceria based catalysts



# Pt-based catalysts

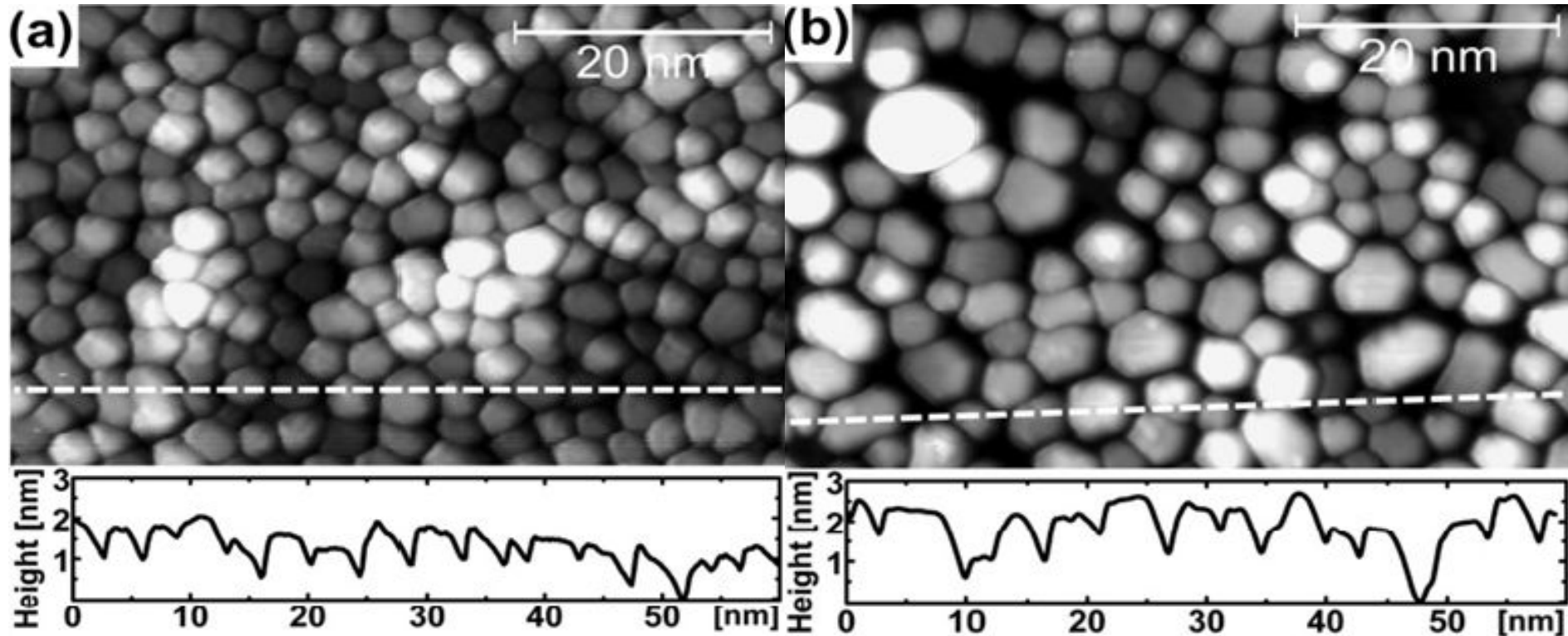
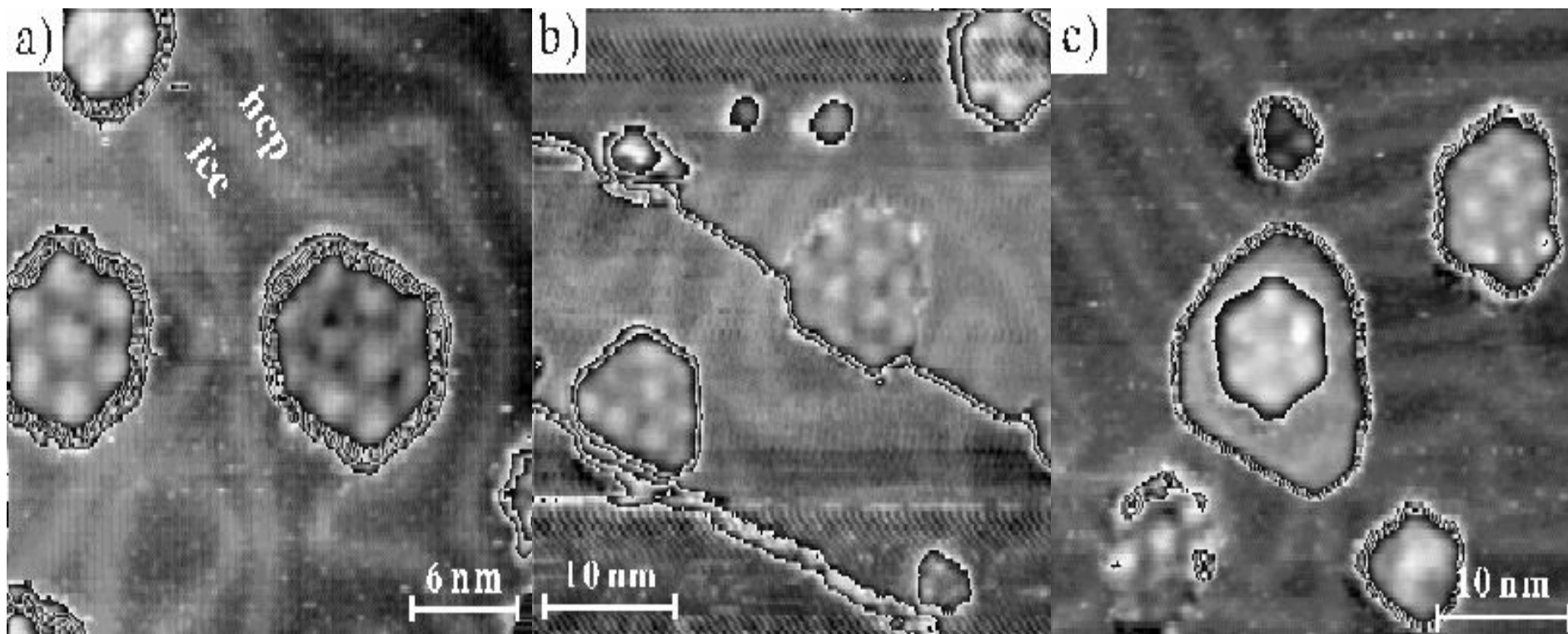


Image width: 60 nm. Tunneling parameters: (a)  $U_s = 2.6$  V,  $I = 0.4$  nA and (b)  $U_s = 2.5$  V,  $I = 0.3$  nA.

# 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  $\text{CoO}$  and  $\text{Co}_3\text{O}_4$  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  $\text{H}_2\text{O}$ ,  $\text{O}_2$  and methanol ( $\text{CH}_3\text{OH}$ ) on previously developed and quantitatively controlled model catalyst systems.

Thanks for your attention!