



FUTURE DIRECTIONS IN CATALYSIS

STRUCTURES THAT FUNCTION ON THE NANOSCALE

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**CATALYSIS:
A NANOSCALE APPROACH**





HDS

Al₂O₃

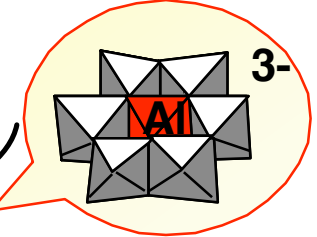
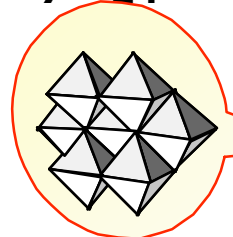


H₂S/H₂

OXIDIC PRECURSOR



SUPPORTED OXOMETALLATE PREPARATION



Alumina surface



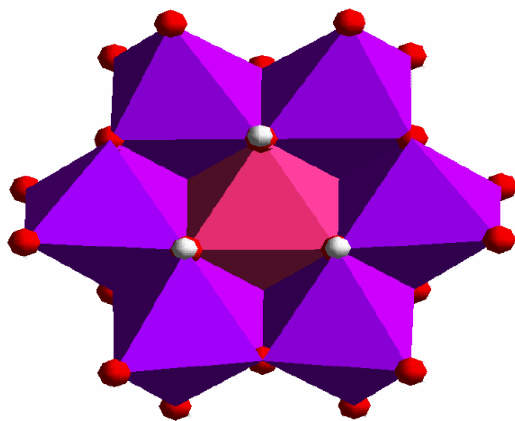
DISSOLUTION/PRECIPITATION CONCEPT



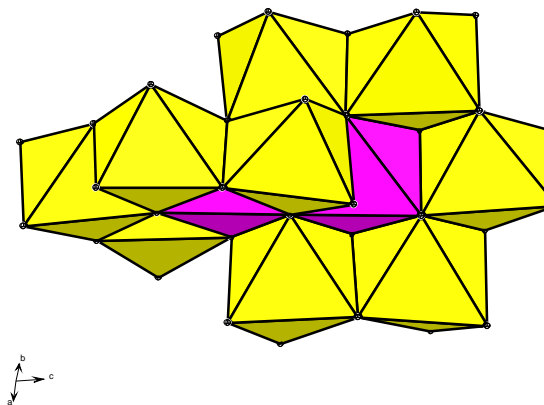
MOLECULAR DESIGN OF THE SUPPORTED OXOMETALLATE PHASE



HPA DEPOSITION



Lost upon deposition



Preserved upon deposition

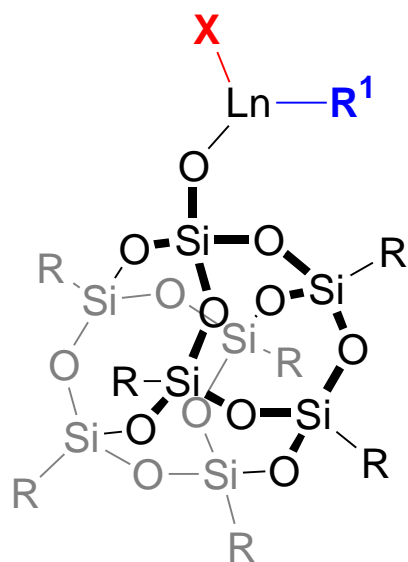


Activity improvement

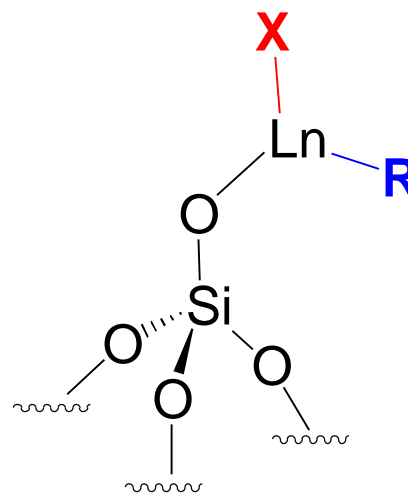
MOLECULAR DESIGN OF THE SUPPORTED ACTIVE PHASE



GRAFTING



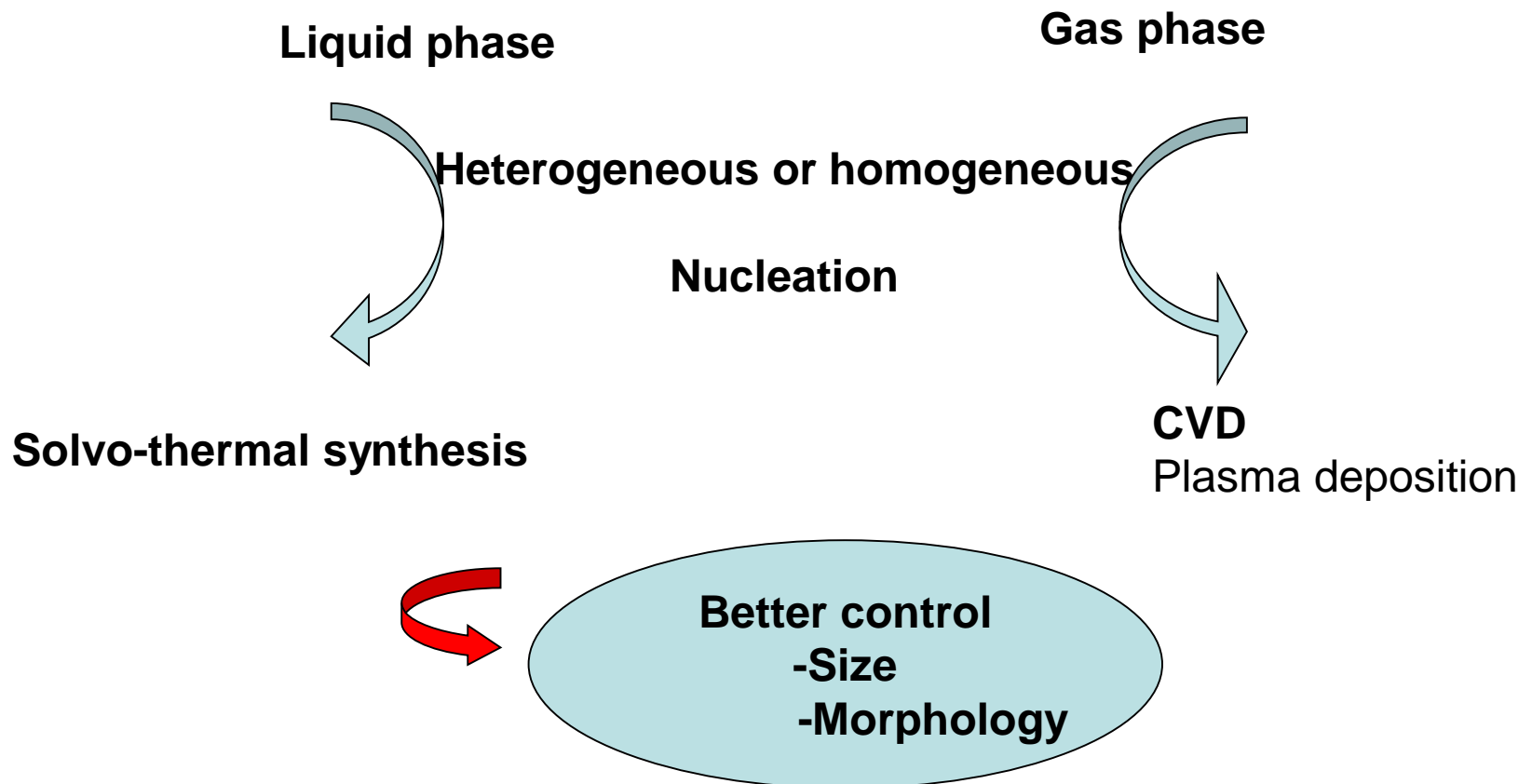
Homogeneous models



Example of a supported lanthanide polymerization catalyst

NANO-DESIGN OF THE SUPPORTED / BULK OXOMETALLATE PHASE

NUCLEATION /GROWTH



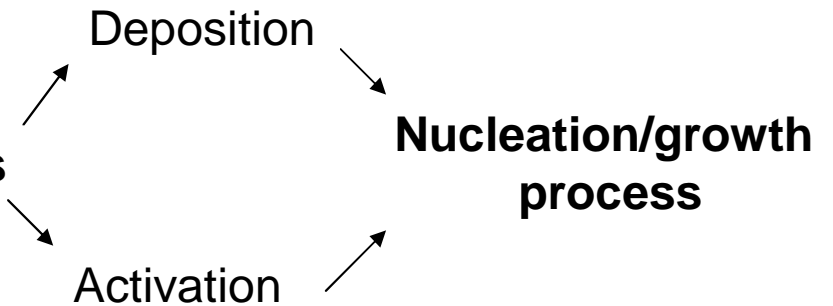
CHARACTERIZATION OF THE ACTIVE PHASE GENESIS



WHY ?



- To identify the **levelling steps**



HOW ?



**IN-SITU Characterization of the genesis,
structure and morphology of the nanoparticles**

Definition of the deposition and activation procedure



Dedicated cells

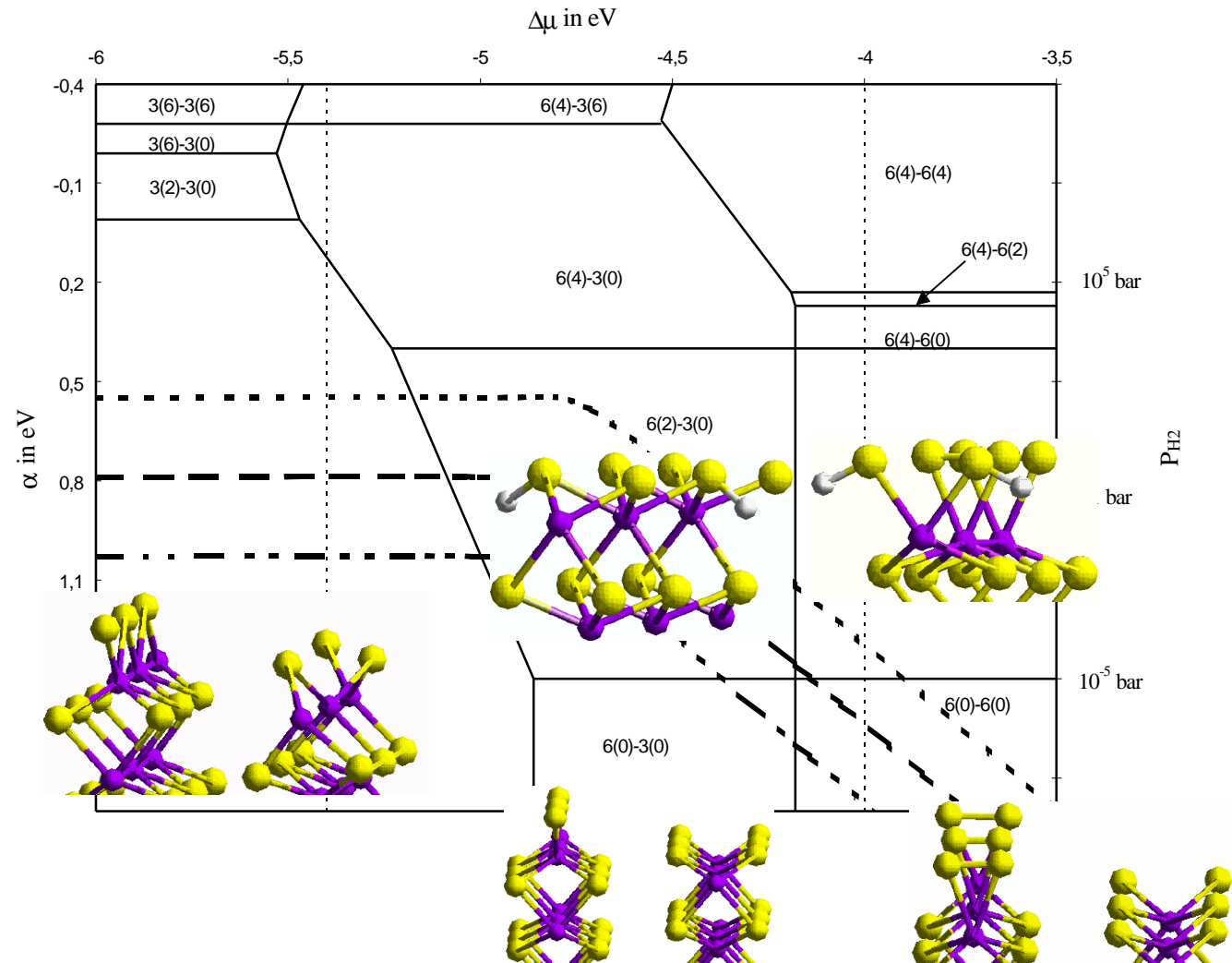


Modelling

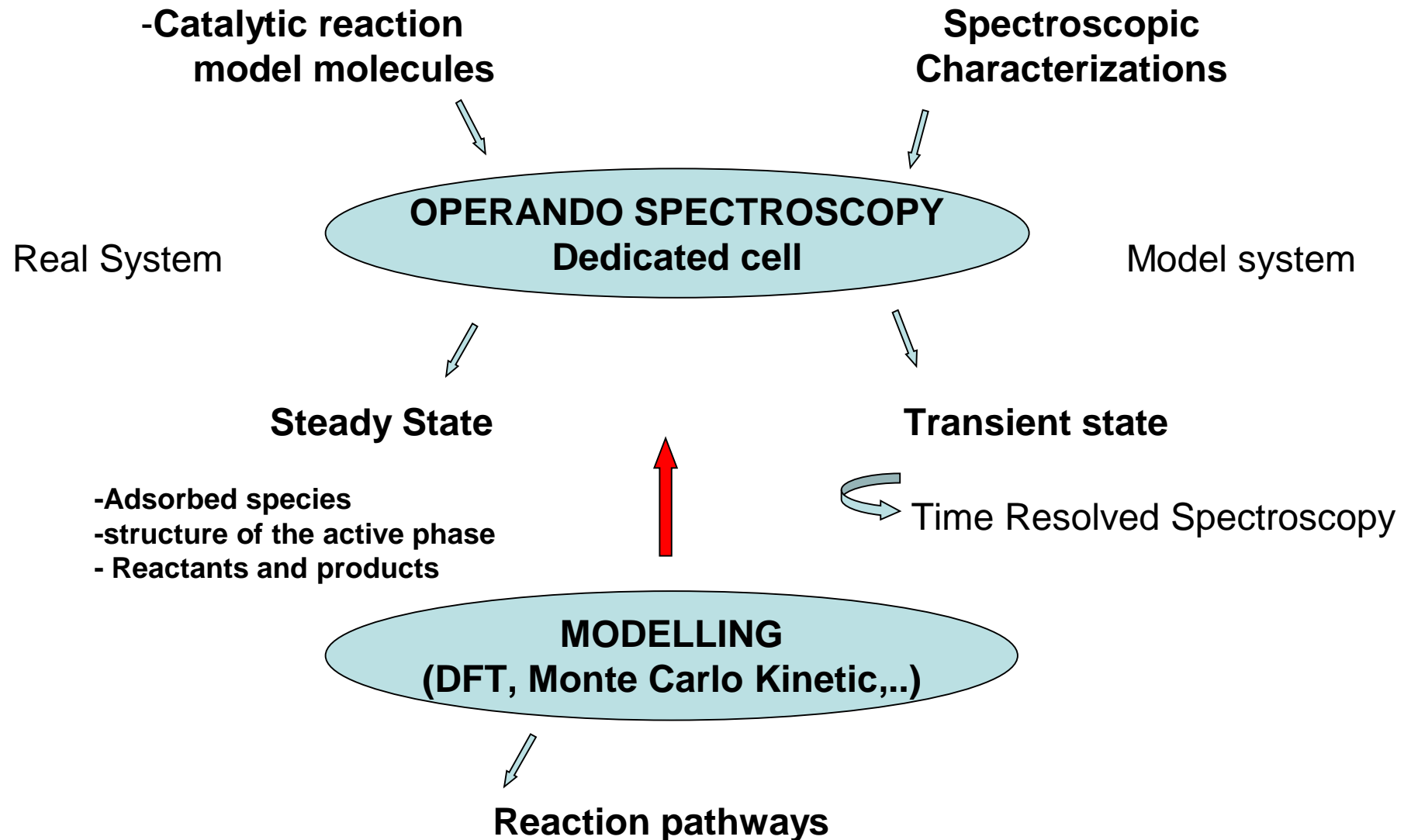
Nucleation/growth

Active sites under the working conditions

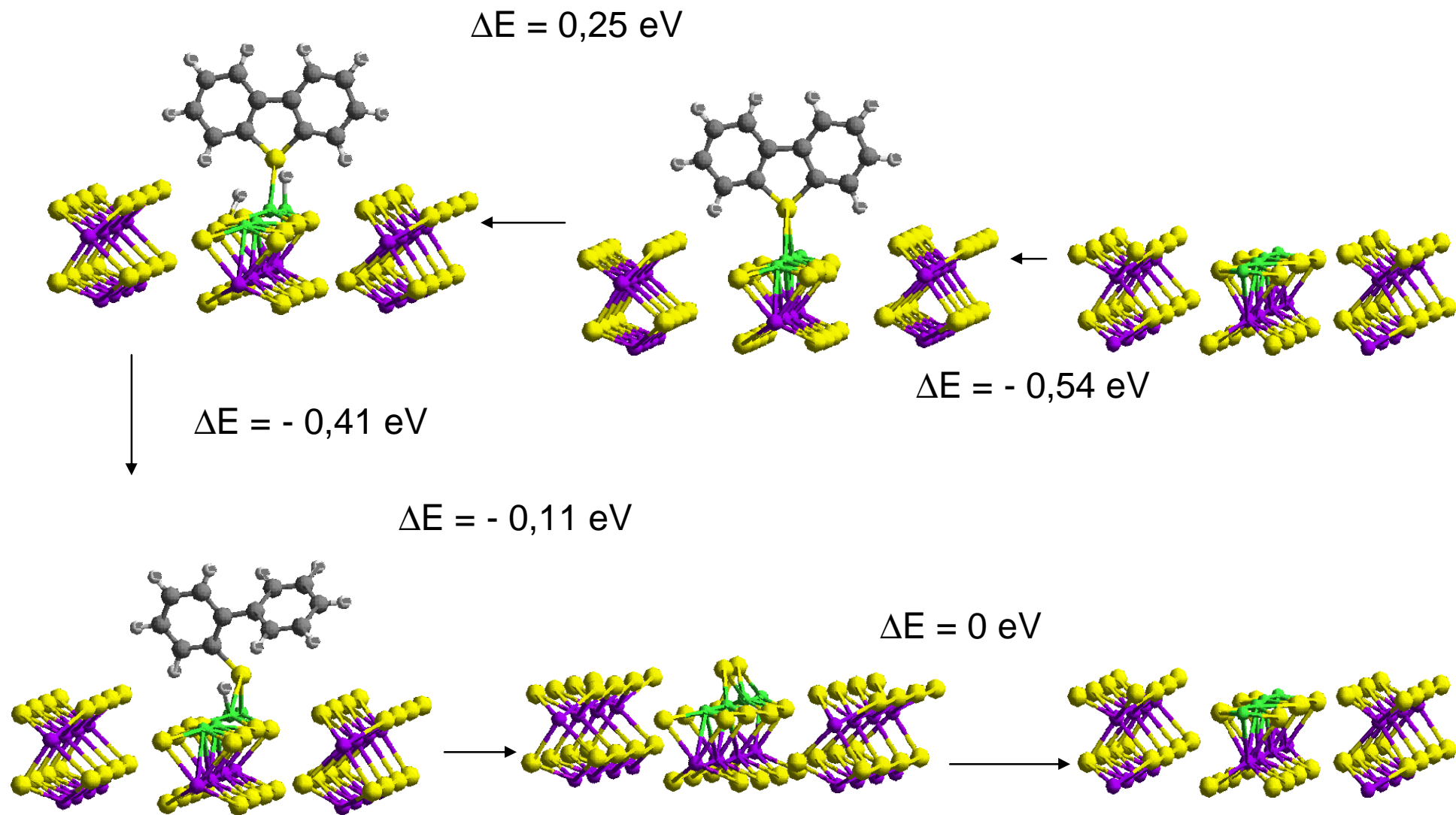
Stable surfaces



CHARACTERIZATION OF THE SYSTEM UNDER WORKING CONDITIONS

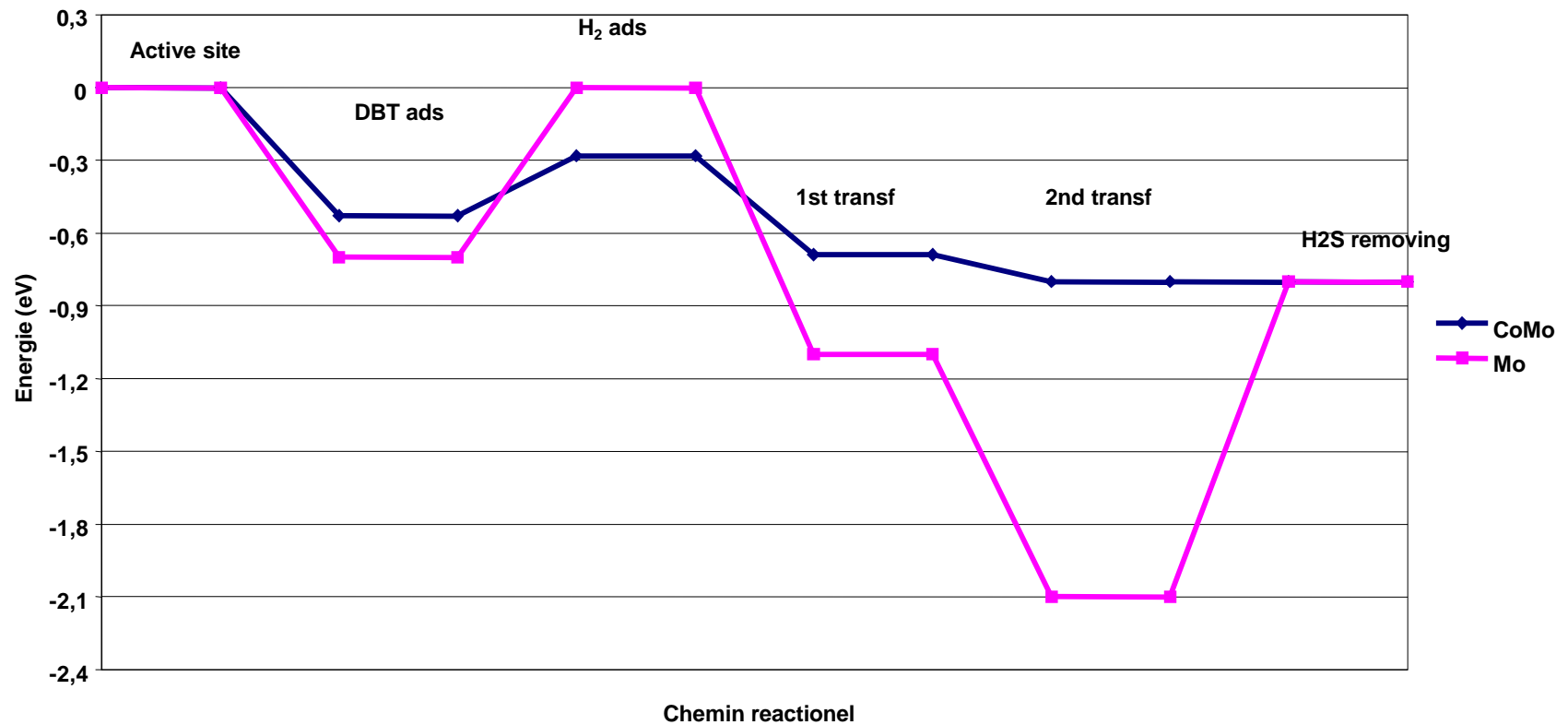


DDS of DBT : Thermodynamic

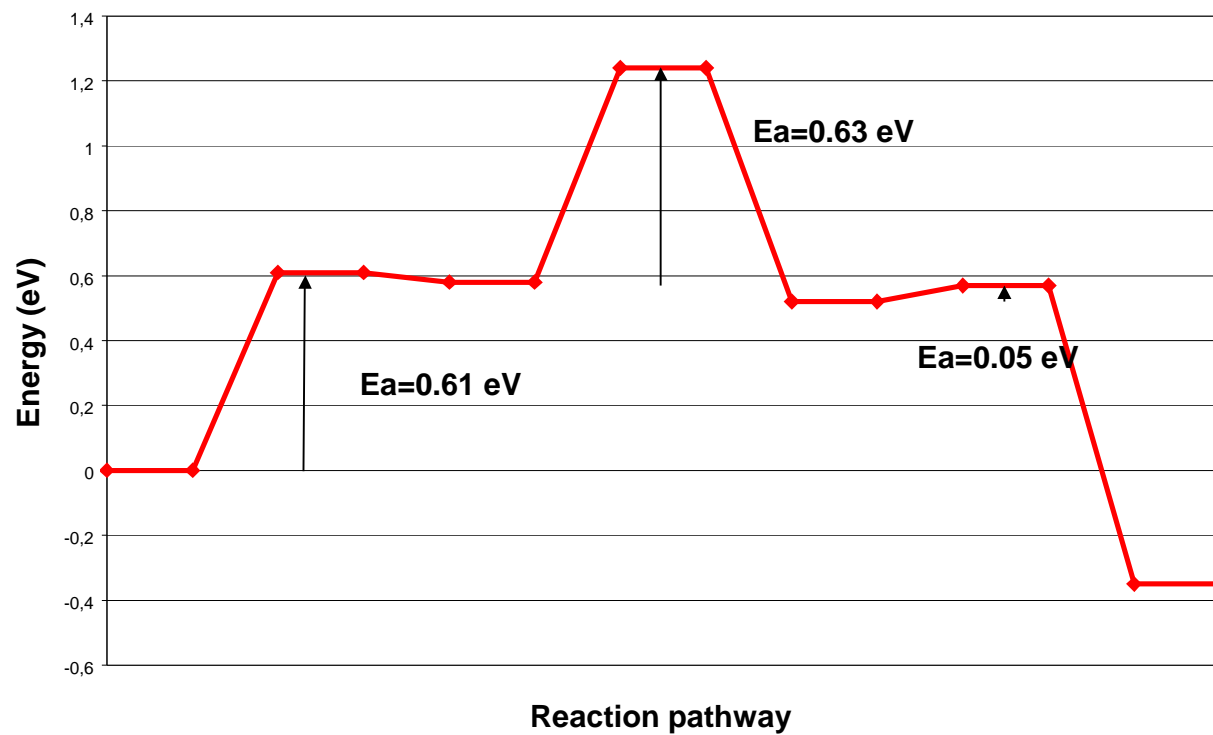
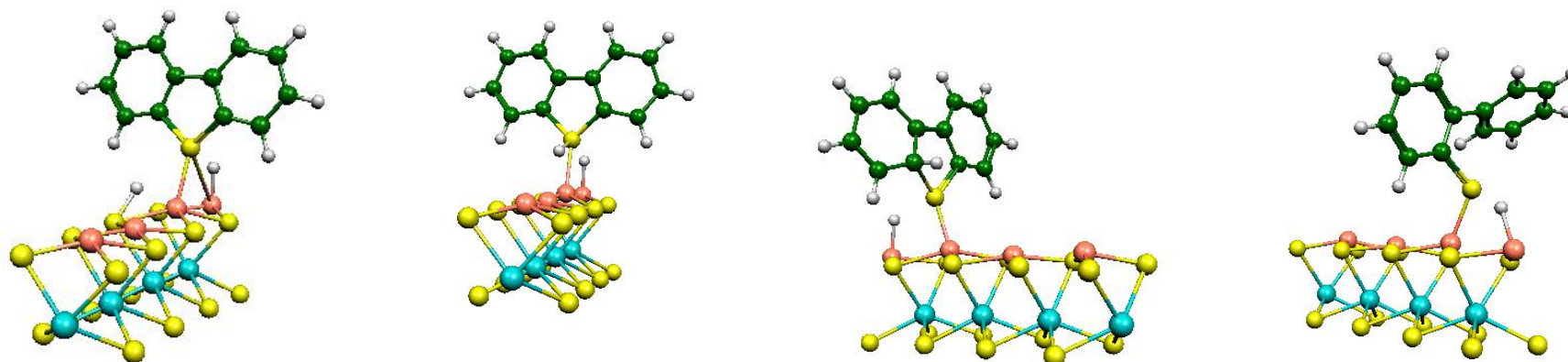


Energy profile

- Comparison between MoS₂ and CoMo



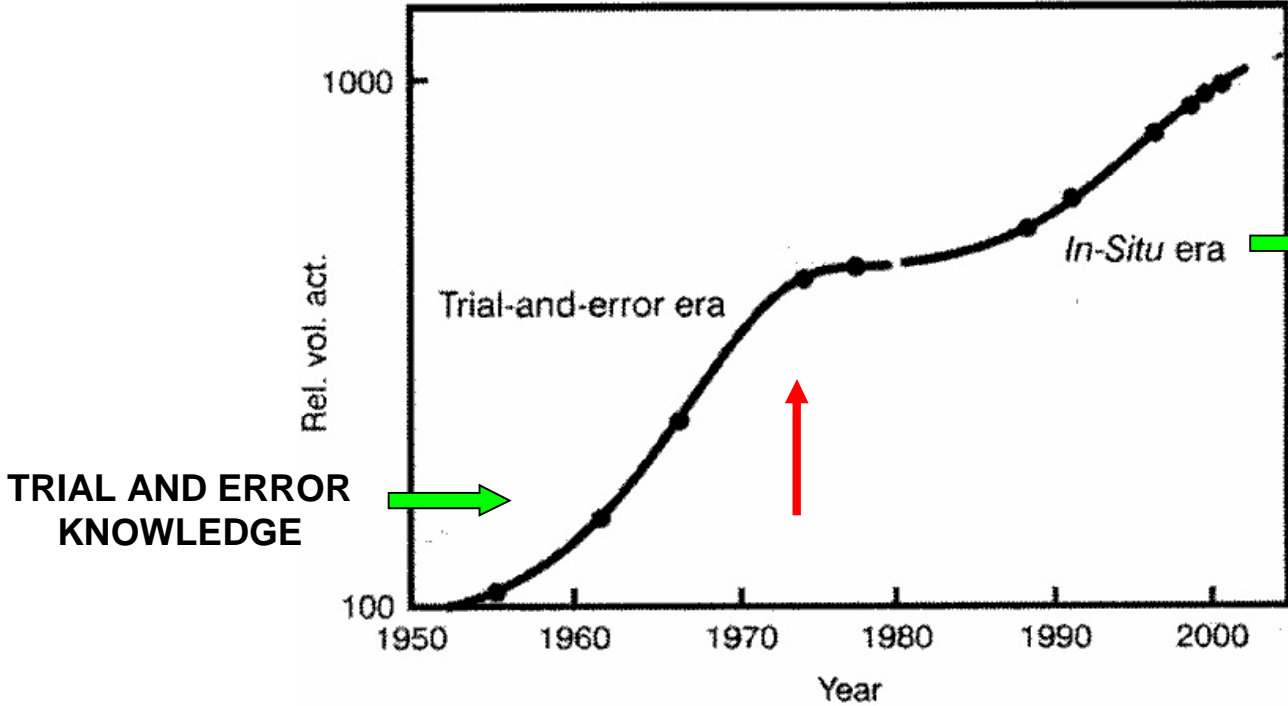
Transfer of the first hydrogen atom



CONCLUSION



Supported sulfides



NOVEL NANODESIGN STRATEGIES AND OPERANDO CHARACTERIZATIONS

NOVEL MOLECULAR DESIGN STRATEGIES

Adapted from H. Topsoe, J. Catal. (2003)

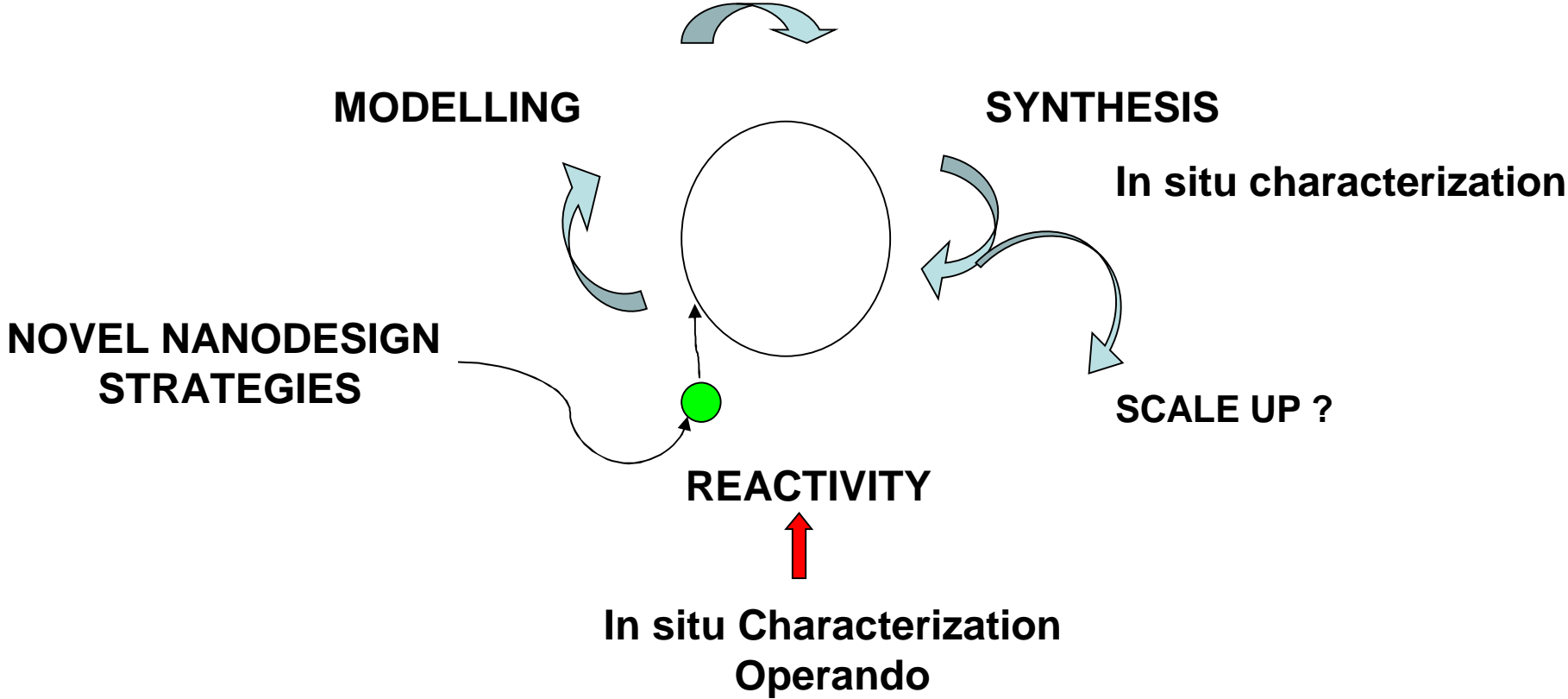


Colloidal metal particles deposition



Divided mixed oxides

CONCLUSION



● = TO DAY