

INVITED ORAL PRESENTATION

About the complexity of characterizing heterogeneous catalysts

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Catalysis is the backbone of energy conversion, chemicals and fuels synthesis, and exhaust clean-up processes. Within the thermodynamic boundaries, set by the temperature and pressure conditions, the catalyst speeds up the chemical conversion. The desire to move away from fossil-based resources requires the development of novel processes and catalysts. Such development is supported by the understanding of the functioning of the catalyst and the role(s) between structure and performance, explaining the large efforts to characterize catalysts.

Despite decades of efforts, a general understanding at the molecular level of the catalytic process remains more often than not elusive. During the talk, I will describe what is the origin of this, what makes the characterization of a functioning catalyst so difficult, and why understanding of industrial processes has seldom been achieved. From simple thermodynamic considerations, via surface adsorption phenomena, to description of surface reactions and materials and pressures gaps, guidelines how to obtain structure - performance relations will be defined.