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Title

Operando methodologies to bridge the gaps towards rational catalyst design - What do we need more?

Abstract

Despite the current and future importance of catalysis in energy transition and environmental protection among others, the design of catalyst materials defined on the nanometer-scale, especially the active sites where desired reactions take place, is far from the dream of catalysis researchers, namely rational catalyst design. This gap between the reality (trial-and-error catalyst design) and the dream (rational catalyst design) largely arises from the lack of precise understanding of catalyst materials and reactive intermediates under working, so-called, *operando* conditions. In this talk, I highlight first the importance of *operando* conditions and general challenges we face in studying catalytic reactions. Our research strategies and activities are presented with personal views on the future development and opportunities of *operando* methodologies.