

Multiple proton-coupled electron transfer and structure sensitivity in electrocatalysis

Professor Marc T.M. Koper
(Leiden Institute of Chemistry, Leiden University)



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This talk will outline a simple but general theoretical analysis for multiple proton-electron transfer reactions, based on the microscopic theory of proton-coupled electron transfer reactions, recent developments in the thermodynamic theory of multi-step electron transfer reactions, and the experimental realization that many multiple proton-coupled electron transfer reactions feature decoupled proton-electron steps in their mechanism. The theory will be discussed in relation to the experimental results for a number of redox reactions that are of importance for sustainable energy conversion, including oxygen reduction and evolution, and the electrocatalytic reduction of CO₂, focusing on their pH dependence and structure sensitivity.

問合せ先: 触媒化学研究センター・大澤雅俊 (osawam@cat.hokudai.ac.jp・011-706-9124)