In-Situ Reconstruction of Catalyst in Catalysis

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Catalysis is ubiquitous in chemical industry of all kinds, where the catalysts play critical roles for the chemical reaction rate and product selectivity. In this talk, we are going to explore the roles of surface reconstruction and phase transition in the chemical reactions with a focus on the electrolysis of water, CO_2 reduction and nitrate reduction. For the electrolysis of water, we found that phase transition happened in the hydrogen evolution reaction (HER), and metal hydroxides/oxyhydroxides were formed on the surface of catalyst in the oxygen evolution reaction (OER). For the nitrate reduction to ammonia, we noticed that the surface reconstruction strongly depended on the working condition and pre-catalyst. For the CO_2 reduction, the surface reconstruction is greatly affected by the electrolyte, and may be beneficial or harmful to the reaction. We conclude that the pre-catalysts need to be well designed for achieving the high performance. The theoretical study is necessary to reveal the reconstruction process.

References

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