

Rational Design of Ceria-based Catalysts for Enhanced Catalytic Activity

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Ceria (CeO₂) is one of the most widely used materials as diverse oxidation catalysts or electrolytes of solid oxide fuel cells due to its high oxygen storage capacity and high stability over a wide range of temperatures. One of the ways to enhance or control the catalytic activity is doping of rare-earth metal or transition metal into the oxide catalysts. Another way is to tune the exposed surface atoms of the catalyst by morphology engineering and doping methods, which were simultaneously applied to boost the reducibility and metal dispersion of an oxide support, thereby increasing the catalytic activity. In this talk, good examples of systematic combination of DFT calculations and experimental analyses to enhance the catalytic performance on ceria-based catalysts will be presented. This rational design approach will shed light on the development of highly active and stable oxide materials for a wide range of catalytic reactions.