Nov 7th, 3:00 PM - 4:00 PM

Achieving high catalytic activity and redox stability of doped ceria through a novel sol gel synthesis

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Ceria is widely studied in catalysis because of its high oxygen mobility and storage capacity. These properties are enhanced by the incorporation of dopant atoms into the ceria crystal structure. However, creating a homogenously doped structure requires a suitable synthesis technique. Otherwise, dopant atoms form an oxide phase on the ceria surface, which blocks highly active catalytic sites. Traditional production methods allow for cerium and dopant ions to segregate during synthesis. In this work, we demonstrate a novel sol gel synthesis method for producing homogeneously doped ceria. The method is easy and avoids the use of hazardous chemicals. Higher dopant loadings and surface areas are achieved, which improves catalytic activity. Further, doped ceria is shown to be stable in both oxidizing and reducing environments, under which traditional catalysts deactivate.