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Comparison of Bulk and Surface Dopants for Stabilizing Ceria Surface Area

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Comparison of Surface and Bulk Dopants for Stabilizing Ceria Surface Area

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Ceria is known to be a great heterogeneous catalyst and catalyst support for both oxygen and hydrogen transfer catalysis. Many of these reactions take place at high temperature where ceria is known to sinter, lose surface area, and become less catalytically active as a result. Ceria, having the ability to bind strongly to many transition metals, can form stable surface and bulk complexes that remain stable even at temperatures up to 800°C. These dopants form stable complexes in atomically dispersed form decorating only the surface or as substitutional or interstitial to the ceria host lattice. The presence of these dopants induces thermal stability in the ceria host oxide by reducing the mobility of the oxygen sublattice. The present work addresses strategies for thermally stabilizing ceria and the potential for catalysis when operating at the single atom limit.