

Abstract Submitted  
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**Ceria Nanoparticles: Environmental Impacts on Particle Structure and Chemistry**<sup>1</sup> DONALD BAER, PRABHAKARAN MUNUSAMY, AJAY KARAKOTI, SUNTHARAMPILLAI THEVUTHASAN, EMSL Pacific Northwest National Laboratory, SATYA KUCHIBHATLA, Battelle Science and Technology India, SUDIPTA SEAL, University of Central Florida — Ceria nanoparticles are widely studied for catalytic, energy, environmental and bio-medical applications. The performance of ceria often depends on the ability of Cr to switch between +3 and +4 oxidation states. This paper summarizes observations of the impact that synthesis route, processing conditions, storage and environmental conditions have on the chemical and physical properties of ceria nanoparticles. Particles less than 10 nm in diameter are highly dynamic and change their oxidation state not just as a function of size, but also as a function of aging (time) and environmental conditions. During particle nucleation and growth, both particle size and oxidation state change with time. These observations suggest that interpretations of experimental results based primarily on particle size may be misleading. Raman and microXRD studies indicate that these changes can be more complex than anticipated. Because synthesis, analysis and relevant operational conditions often place particles in different environments, understanding how particles change with time in operational conditions is essential to predicting their properties. Time and environmentally induced changes may also play a significant role in the discrepancies reported in various studies.

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