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Synthesis of aqueous nanodispersed nanocrystalline ceria suspensions by a novel organic/inorganic precipitation method.

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Abstract

A low cost and environmentally friendly methodology was developed to produce highly stable, nanodispersed, aqueous suspensions of uniform CeO₂ nanocrystals with a mean size at around 5 nm. The synthesis is a hybrid precipitation route that takes place at room temperature from a cerium nitrate solution in the presence of a functional polymer that can act both as complexing and dispersing agent. A hyperbranched poly(ethylene)imine (PEI) or the sodium salt of carboxy-methylated poly(ethylene)imine (Trilon P) were investigated for this purpose with very positive results concerning the stability and the dispersion degree of ceria. Between them, the nanoceria suspensions containing the Trilon P are extremely stable and almost monodispersed, whereas PEI based suspensions show loose nanosized agglomerates according to TEM and even DLS measurements.

Keywords: Ceria; nanodispersed suspension; nanocrystallinity; precipitation; hyperbranched poly(ethylene)imine; carboxy-methylated poly(ethylene)imine.

1. Introduction

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