

Electrochemical and spectroscopic characterization of cerium salts and nanoceria materials

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The nanoscale form of cerium oxide, nanoceria (*nano-CeO_x*), has drawn great attention in recent years in electrochemical, nanomaterial research and medicinal studies due to its antibacterial properties, UV absorption, and its biochemical function as possible radical scavenger. Many new synthesis methods have achieved uniform and biocompatible nanoceria particles, and our lab has created cerium oxide particles that shows UV/Vis. absorption and X-ray patterns similar to the commercial nanoceria and nanoceria made in other research laboratories with novel synthetic methods.

This study focuses on charactering and comparing electrochemical properties of cerium inorganic salts and synthesized nanoceria. Preliminary results have observed the redox peaks of Ce³⁺ and Ce⁴⁺ ions such as cerium (III) nitrate on platinum electrode using cyclic voltammetry, square wave voltammetry, and other electroanalytical and spectroscopic techniques. When nanoceria is added in an electrochemical cell or is deposited on the surface of a working electrode, the redox behavior exhibited by the introduced or deposited nanoceria is compared with the redox behavior of free aqueous cerium ions from salts. Our observation and analysis will help characterizing the electrochemical properties of the nanoceria and help explain its interaction with biomolecules when introduced in living cell and other biochemical conditions.