Oxidase Activity of Polymeric Coated Cerium Oxide Nanoparticles

Advantages

- ELISA based assays incorporating this technology will not require an additional horseradish peroxidase bound antibody or the addition of hydrogen peroxide.
- Oxidase activity is selective to only lower pH environments (pH 1-4)
- Polymer coated nanoparticles are far more stable than the currently utilized oxidants
- Cerium oxide polymer coated nanoparticles are inexpensive to produce and conform well with FDA and GMC regulations

Invention

The use of polymer coated nanoceria as an aqueous oxidizing agent with enhanced activities at an acid pH.

Background

Redox reactions are utilized in a wide variety of industrial and research applications, establishing a need for a reliable and efficient redox catalyst. Recently University of Central Florida Nanoscientists discovered that under lower pHs (1-4), polymer coated nanoceria exhibit strong Oxidase activity.

Reagents currently used as oxidants, such as hydrogen peroxide, are chemically unstable, harmful to biological tissues and damaging to the environment. By utilizing a well studied polymer coating and novel inexpensive nanoparticle synthesis methods a stable redox catalyst was created which displays Oxidase properties at low pHs.

Application

The nanoceria particles can be utilized for a variety of commercial processes. The polymer coating each nanoceria core provides functional groups for the addition of targeting agents. The particle can thus be utilized in both Enzyme Linked Immunosorbent Assays (ELISA) as well as other immunoassays commonly used in histology which previously utilized horseradish peroxidase and required hydrogen peroxide. Other redox applications include the decomposition, decontamination or inactivation by oxidation of organic contaminants such as microorganisms or toxins for water treatment.

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Selected References


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