Southern Illinois University System

Nano-Reagents with Cooperative Catalysis

Less expensive industrial catalysts are desirable that are substantially free of precious medals. Furthermore, having catalysts that are recoverable, stable and function in mild conditions are also highly desired. The present invention embodies these desired characteristics that have broad application uses such as catalyzing the hydrolysis of an environmental pollutant, deactivating a chemical warfare agent and industrial saponification just to mention a few.

Applications

- Catalyzing hydrolysis
- Recoverable catalysts

Inventor(s)

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Dr. Gao is an associate professor of chemistry and biochemistry at SIU Carbondale. His research focuses on novel carbon-based materials for fuel cells, CO_2 separation, and other clean energy projects.

Invention

SIU researchers have developed a nanocatalyst that comprises at least one amino acid residue attached to a nanoparticle, wherein the reactive side chain of the amino acid catalyzes a chemical reaction. The catalyst(s) may be used to catalyze the hydrolysis of ester bonds, phosphoester bonds, and phosphodiester bonds. There are other types of bonds that may be catalyzed such as hydrolysable bonds and many others as described in the issued patent. The reaction conditions are deemed mild reaction conditions such as near neutral pH environments, moderate temperatures and within aqueous solutions. However, depending on the application, a reaction mixture may further comprise of a buffering agent, a cation, a surfactant, an organic solvent, a reducing agent, or a co-reactant.

Key Advantages

- Mild reaction conditions
- Broad applications
- Catalysts are readily recoverable

Status

U.S. patent #7,951,744 issued May 31, 2011. The technology is available for license.

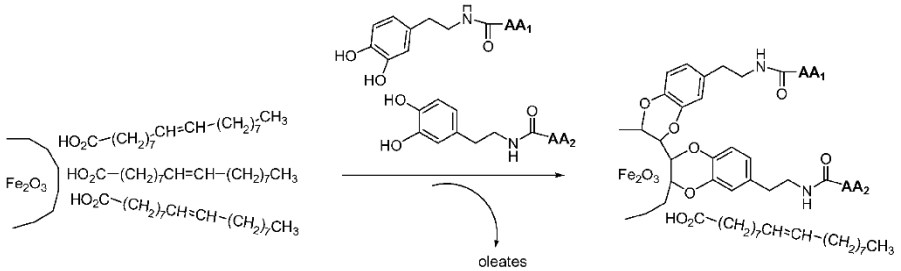

Figure illustrates the surface-exchange reaction during the synthesis of a nanocatalyst attached to an iron oxide nanoparticle.

Other opportunities related to this technology, included but not limited to sponsored and/or collaborative research, may be available.

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