Soluble biopolymer catalyst backbone

Chitosan has been modified transforming the sparingly soluble natural polymer so that it becomes almost completely soluble in aqueous media. This broadens the application to green chemistry technologies that replace or minimise the use of organic solvents particularly in the pharmaceuticals industry.

Chitin is the second most abundant natural biopolymer in the world, behind cellulose. This abundance, combined with the specific chemistry of its derivative, chitosan, provides for an array of potential applications. Chitin is recovered from a number of bio sources such as waste crayfish shells.

The present trend, in industrial applications, is to produce high value products, such as cosmetics, drug carriers, feed additives, semi-permeable membranes, chromatographic supports and supported catalysts. The difference in value between newly developed high-end products and the low-cost polymers that dominated the industry in the past is one of the main driving forces behind studies on new applications of chitin and chitosan in both chemical and biotech industries.

Benefits

- Current technologies utilise polymer-free homogeneous catalysts, or heterogeneous synthetic polymer-based catalysts, or unmodified chitosan. The latter two polymers have limited solubility whereas the modified chitosan polymer is water soluble, biodegradable, and permits double the catalyst loading
- The polymer can be selectively functionalised to perform stereo-selective reactions (stereo-selective hydrogenation and carbon-carbon bond formation are likely)

Applications

A number of industrial opportunities exist for application of the biopolymer support. There is an opportunity to establish a business creating specialist catalysts for a variety of industrial applications. This can also be achieved through joint technology development ventures and ultimately catalyst lisencing or supply.

Market

The main market is the production of catalysts used in the production of pharmaceuticals, fine chemicals, cosmetics, and in the biotechnology industry.

Keywords: Chitosan, catalyst, biopolymer, water-soluble, sustainable, biodegradable

Intellectual Property Rights:
Patent

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Technical description

Chitin derived from a source such as crayfish shells is converted to chitosan. In turn the chitosan is modified (by converting the 6-hydroxy group of the polymer to a 6-amino-group). The modified-chitosan polymer support which can have a variety of linkers onto which active molecules can be attached. For example, a metal immobilised 6-amino-6-deoxy-chitosan, which utilises Schiff-base ligands as linkers that coordinate metals such as palladium, platinum, rhodium, ruthenium, iridium, manganese, osmium, nickel, cobalt and iron.

Intellectual Property Status

Type	Region	Application No	Filing Date	Publication Number	Priority Date
Provisional	South Africa	2009/06358	14-Sep-09		14-Sep-09
PCT	PCT	PCT/IB2010/002291	14-Sep-10	WO 2011/083360	14-Sep-09
National Phase	Britain	GB 10842020.9			14-Sep-09
National Phase	China	201080040614.2	13-Mar-12	CN102639627A	14-Sep-09
National Phase	Europe (France, Germany, Ireland, Italy, Switzerland)	10842020.9	04-Apr-12	2478049	14-Sep-09
National Phase	India	2724/DELNP/2012	29-Mar-12		14-Sep-09
National Phase	South Africa	2012/02047	20-Mar-12		14-Sep-09
National Phase	United States	13/496,116	14-Mar-12	US2012/0178916 A1	14-Sep-09

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