Biocompatible Polymeric Hydrogels for Controlling Nucleation and Loading of Hydrophobic and Hydrophilic materials

Technology #16519

Applications

This invention involves the development of a biocompatible hydrogel capable of controlling crystallization and carrying water soluble and insoluble pharmaceuticals for delivery in different chemical environments. This technology could be of particular interest to the pharmaceutical industry, food industry and industries requiring crystallization of small organic compounds.

Problem Addressed

Biocompatible materials capable of controlling crystallization in different chemical environments, while carrying large amounts of active pharmaceutical ingredients (APIs), are highly desirable for industrial practices. A method for controlling crystallization is nucleation, a critical step in the crystallization process, where heteronucleant materials are specifically designed to influence selective interactions with target compounds. In industrial practice, compounds to be crystalized are diverse in chemical structure and in physical properties, such as solubility. Therefore, designing biocompatible heteronucleants capable controlling crystallization and carrying vast amounts of pharmaceutical compounds in diverse environments is a challenge. A promising material for heteronucleant design is synthetic poly (ethylglycol) (PEG) an exceptional material for controlling nucleation. However, PEG hydrogels are prepared by free radical polymerization, a process generally avoided in the pharmaceutical industry.

This invention involves designing a nanostructure and chemical makeup of a biocompatible alginate hydrogel capable of controlling nucleation from compounds with different polarities and chemical properties.

Technology

This invention involves the design of biocompatible hydrogels and emulsion-laden hydrogels from a natural polysaccharide found in brown algae, Alginate (ALG), as heteronucleant. Investigators demonstrate that nucleation kinetics of alginate hydrogels is tightly controlled by increasing or decreasing alginate concentrations. In addition, alginate hydrogels are able to encapsulate large amounts of drugs with vastly different water solubilities.

Advantages

- Hydrogels are biocompatible
- Hydrogel nanostructure controls nucleation kinetics
- Hydrogel nanostructure carries relevant amounts hydrophilic and hydrophobic substances
- More efficient processing and a good way to solubilize poorly soluble drugs

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Categories For This Invention:

Hydrophobic/Hydrophilic
Micro & Nanotech
Nanomaterials
Nanotechnology
Polymers (Materials)
Biotechnology
Other (Biotechnology)
Polymers (Chemicals)
Drug Delivery

Intellectual Property:

Polymer matrices for controlling crystallization
PCT
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Publications:

Biocompatible Alginate Microgel Particles as Heteronucleants and Encapsulating Vehicles for Hydrophilic and Hydrophobic Drugs
Crystal Growth & Design
2014 14 (4), 2073-2082

External Links:

Trout Lab
http://web.mit.edu/troutgroup/
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Image Gallery:

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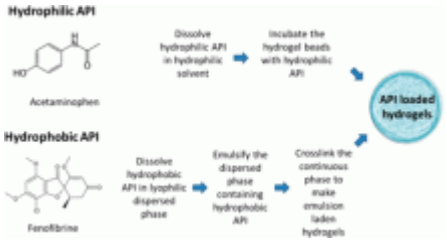

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