Fabrication of a Protective Shell for a Magnetic Particle Core
Technology #14542

Applications

Magnetizing substances, such as drugs or cells, is a method of removing them from various mediums. For example, magnetized drugs can be easily extracted from blood, while magnetized pollutants can be easily removed from water sources. This is done by attaching magnetic particles to the substances, which allows them to be easily separated from their medium by applying a magnetic field.

The current technology describes a method of fabricating the attached magnetic particles such that they are more durable.

Problem Addressed

The magnetic particles tend to lose their functionality over time, either due to loss of magnetization of the particles, or from being dissolved or oxidized by the aqueous solutions in which they are used. Methods currently exist to create a protective shell around a magnetic core, in order to increase the durability of these particles. However, such methods of fabrication are either cumbersome, or not applicable to a wide range of aqueous media. The current technology presents a variety of alternative methods to develop a protective shell around a magnetic core that overcomes these challenges.

Technology

The current technology describes the development of a silicon dioxide shell around a plurality of magnetic nanoparticles (such as magnetite). The silicon dioxide shell would contain various functional groups (such as functionalized alkyl silanes) which are covalently bonded to the shell, and allow the overall particle to attach to other substances. Depending on the type of attachment desired, different functional groups can be chosen. The technology also describes methods of producing these shells, by combining an aqueous solution of magnetite, a reactive silicate and the functionalized alkyl silanes.

Advantages

- Uses synthetic functional groups that are less susceptible to biological degradation
- Protects a magnetic core from oxidation and dissolution
- Can be fabricated without the cumbersome use of microemulsion

Categories For This Invention:

Water Treatment
Life Sciences
Chemicals
Clinical Applications

**Intellectual Property:**
Core-shell magnetic particles and related methods
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**External Links:**
Hatton Group
http://web.mit.edu/hatton-group/

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