Hollow & Porous Silica Nanoparticles of Various Shapes — Rapid, Scalable, and Simple Production

The University of North Dakota has developed a rapid and scalable method for producing hollow Silica nanoparticles with a variety of highly reproducible shapes. The nanoparticles are porous, so certain materials may be taken in or released over time.

Possible Applications

Incorporate a chemical or ingredient into the hollow core that gradually diffuses into surroundings.

- Insect traps in which the particles release pheromones
- Delivery of volatile catalyst over time from within a reactor
- Controlled release of air fresheners and perfumes
- Drug or active ingredient delivery with extended release

Absorb chemicals from the environment or other setting to detect and/or quantify chemicals in a particular setting or location.

Advantages

- “Soft-Template” synthesis — soft template forms consistent size and shape within a batch, but is easily removable to reduce manufacturing complexity and particle breakage
- Rapid, simple, and scalable production and removal of the soft-template core.
- Alternative shapes can be utilized to adjust physical behavior and packing density of the particles
- Store as a dry powder or suspended in water at room temp

The Technology

Hollow nanomaterials are produced by sequentially combining polyvinylpyrrolidone and alcohol, then water, sodium citrate, a silicon containing compound, and a catalyst. Create the shapes using different alcohols, e.g., propanol for tadpole shape, ethanol for spheres, and pentanol for nanowires.

contact

Tara Koplin
(701) 777-3287
tara.koplin@research.und.edu

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