Recycling nanoparticles

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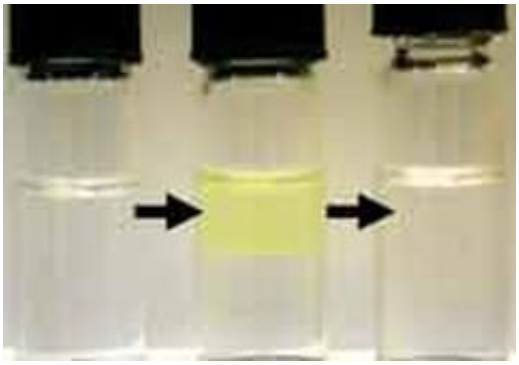

Temperature-induced separation and dispersion of cadmium sulphide nanoparticles. Image by Julian Eastoe

(PhysOrg.com) -- Some nanoparticles are more precious than gold, so being able to recycle them would offer manufacturers important cost savings. Professor Julian Eastoe at the University of Bristol, and colleagues, report the development of a special type of microemulsion that may make it easier for manufacturers to recover, recycle, and reuse nanoparticles.

Professor Julian Eastoe at the University of Bristol, and colleagues, report the development of a special type of microemulsion - a mixture of oil and water (mayonnaise is an edible emulsion) - that may make it easier for manufacturers to recover, recycle, and reuse nanoparticles.

In laboratory tests using cadmium and zinc nanoparticles, they demonstrate how the oil and water in the microemulsion separated into

two layers when heated. One layer contained the nanoparticles that could be recovered and the other contained none.

Importantly, the team reports, the recovered particles retain their shape and chemical properties, which is crucial for their reuse. The new method could speed application of nanotechnology in new generations of solar cells, flexible electronic displays and various other products.

Julian Eastoe said, “Recovering and recycling nanoparticles is especially difficult because they tend to form complex, hard-to-separate mixtures with other substances. We have designed a new kind of solvent which is perfectly suited to nanotechnology.

“A significant advantage of this method over more traditional approaches is that it is much milder on the particles, thereby preserving their structure and stability, and permitting recyclability. Additionally, it allows us to separate and recover the nanoparticles ‘at the flick of a switch’, simply by changing the temperature.”

This simple process may potentially find applications in cleanup and purification technologies in order to recover, redisperse and reuse valuable nanomaterials. Without this new development, manufacturing processes that take advantage of the unusual properties of nanoparticles might become prohibitively expensive.

The study appears in *Langmuir*, a bi-weekly journal of the American Chemical Society.

Provided by University of Bristol