New Method Creates Porous, Multifunctional Silica Nanoparticles

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Silica, the mineral of which sand is made, is generally inert in the body and can be modified easily using a variety of well-established chemical reactions. As such, researchers have considered silica an ideal candidate material from which to create multifunctional nanoparticles.

Indeed, several teams of investigators have crafted porous nanoparticles and shown that these materials hold promise as drug delivery vehicles, imaging agents, and even nanoscale collection devices for cancer markers.

Now, thanks to work from Chung-Yuan Mou, Ph.D., and colleagues at the National Taiwan University in Taipei, researchers have a new method for making silica nanoparticles that not only have carefully sized pores and are of a very narrow size distribution, but that are also magnetic and luminescent. The multiple functionality could enable investigators to create nanoparticles that can both image and treat tumors simultaneously.

This work appears in the journal *Chemistry of Materials*.

The investigators created their silica nanoparticles by starting with size-controlled iron nanocrystals and coating them with a porous silica shell. The researchers used mild chemical conditions for the coating step, allowing them to add dye molecules to the reaction mixture. The resulting particles, which are oblong in shape, have a magnetic core, and a porous, luminous shell.

Imaging experiments with these nanoparticles showed that they contained the proper magnetic properties to function as magnetic resonance imaging contrast agents. Additional experiments showed that cancer cells grown in culture take up these nanoparticles in amounts large enough for the particles to be seen using confocal fluorescence microscopy. The particles themselves were not toxic to cells at relatively large doses.

This work is detailed in a paper titled, “Multifunctional composite nanoparticles: magnetic, luminescent, and mesoporous.” This paper was published online in advance of print publication. An abstract is available at the journal’s website.

Source: National Cancer Institute