New Nanoparticle Structure Boosts Magnetic Properties

Magnetic nanoparticles have shown promise as contrast-enhancing agents for improving cancer detection using magnetic resonance imaging (MRI), as miniaturized heaters capable of killing malignant cells, and as targeted drug delivery vehicles. Now, researchers at the University of Idaho have developed a new type of nanoparticle that produces a magnetic field up to 10 times stronger than typical iron oxide nanoparticles. Clearer MRI images of small tumors and more accurate tumor targeting could be the result.

A research team led by You Qiang, Ph.D., reports in the *Journal of Nanoparticle Research* that it has developed a method for creating iron nanostructured clusters that can then be coated with a thin layer of iron oxide. The investigators also discuss how their method can create these so-called “core-shell” nanoparticles of exact size ranging from 2 nanometers to 100 nanometers in diameter.

Characterization of these core-shell nanostructures show that their magnetic moment, a measure of their strength as a magnet, depends on the size of the final particle – particles with a diameter of 3 nanometers have a magnetic moment of 80 emu (the unit of magnetic moment) per gram, while those with a diameter of 100 nanometer have a magnetic moment of 205 emu per gram, close to the maximum value for pure iron. In contrast, typical iron oxide nanoparticles have a magnetic moment of 20 to 30 emu per gram.

This work is detailed in a paper titled, “Iron/iron oxide core-shell nanoclusters for biomedical applications.” This paper was published online in advance of print publication.

Soruce: National Cancer Institute