

Magnetic, luminescent nanoparticles set new standard

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Researchers at UC Davis have created a new type of nanoparticles that could be used in tests for environmental pollution or contamination of food products, and for medical diagnostics.

The particles, about 100 to 200 nanometers in size, are luminescent, magnetic and inexpensive to make, and can be tagged with antibodies. They are made up of a magnetic core of iron oxide or iron/neodymium/cobalt oxide coated in a shell of europium and gadolinium oxide. When stimulated with a laser, europium emits red light at a very specific wavelength.

The nanoparticles can be manipulated with magnets and detected by fluorescence. They could also be labeled with other fluorescent labels in different colors, or used as part of an assay with other fluorescent labels. The built-in europium luminescence acts as an internal standard, making it easier to carry out accurate quantitative assays, said Ian Kennedy, professor of mechanical and aeronautical engineering and senior author on a paper describing the work.

The particles can also be coated with short pieces of DNA and used for genetic analysis. The team is exploring uses including testing for bioterrorism agents such as ricin or botulinum toxin in food and for genetic tests in cancer medicine.

The nanoparticles were made by spray pyrolysis, which involves mixing the raw material in a solvent and spraying it through a flame. The

method is much cheaper than the techniques previously used for making similar particles, and can readily be scaled up to industrial production. It is already used in the chemical industry to make products such as fumed silica and carbon black.

The researchers are establishing a company, Synthia LLC, to develop the technology further.

The paper is published online in the journal *Nanotechnology* and will appear in the Feb. 7, 2007, print issue of the journal.

Other authors on the paper are research specialist Dosi Dosev, Department of Mechanical and Aeronautical Engineering; postdoctoral researcher Mikaela Nichkova, research associate Shirley Gee and Professor Bruce Hammock, all of the Department of Entomology; and physics graduate student Randy Dumas and Kai Liu, associate professor of physics.

Source: University of California - Davis

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