Back

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Multicolor Silica Nanoparticle for Multiplexed Assays

There is little disagreement among cancer researchers today that the diseases they study are ones in which many different molecular processes go awry. There is also little argument that efforts to better study cancer from a "systems biology" perspective would benefit greatly from nanoscale technologies that would track simultaneously multiple molecules within a cell. Quantum dots have shown promise in filling that need, and now, thanks to work published in the journal *Nano Letters*, researchers have another set of multitasking nanoscale structures at their disposal.

Weihong Tan, Ph.D., and his graduate student Lin Wang from the University of Florida have developed a set of silica nanoparticles encapsulating three different dyes that can be tuned to fluoresce with colors ranging from green to dark red. This color tuning is accomplished simply by varying the relative ratio of the three different dyes within a particular nanoparticle. As with quantum dots, these silica nanoparticles retain their bright color long after typical dyes have been bleached by the irradiating ultraviolet light. The silica nanoparticles were both easy to prepare and purify.

These nanoparticles, which are approximately 70 nanometers in diameter, are biocompatible and mix easily with biomolecules in the watery environment of the cell. Equally important, irradiating the set with a single wavelength of light triggers the multicolored fluorescence across all members of the set. An extensive literature on silica chemistry also affords a wide variety of chemical methods for attaching biomarker probes, such as antibodies and aptamers, to the surface of the silica nanoparticles.

This work is detailed in a paper titled, "Multicolor FRET silica nanoparticles by single wavelength excitation." An abstract is available through PubMed.
View abstract.