Methodist Neurosurgeon Makes Quantum Leap on Nano-Level

A neurosurgeon at the Methodist Neurological Institute (NI) is the first to use an enzyme-driven technique to label nanotubes with quantum dots, giving scientists a better way to see single-walled carbon nanotubes.

The ability to do this labeling allows nanotubes, nanomachines, or other nanoscale optical devices to be used for biomedical research. One practical application might include the precise delivery of medications to specific cancer cells, effectively sparing surrounding healthy cells.

Dr. David Baskin, neurosurgeon at the Methodist NI, and his colleagues published these research findings in the March 2006 issue of *BioTechniques*.

Dr. Baskin and Vladimir Didenko, PhD used an enzyme to create a permanent bond to attach semi-conductor nanocrystals, or Q-dots, to nanotubes. Because nanotubes absorb light, making them invisible, researchers have tried to find ways to make them visible inside living organisms. The light absorption properties of the nanotubes are bypassed by using the Q-dots.

“By attaching these Q-dots like beads on a string, we have the potential to link tens, hundreds, thousands of these strings together, creating nanomachines that can act like probes, giving researchers a new view into cancer cells, proteins, and DNA molecules,” said Dr. Baskin.

Once fluorescent, nanotubes can be observed by microscopes, which could enable the construction of nano-size devices. “We’re talking about the possibility of one day developing probes for biomedical research, quantum computing, possibly even a quantum internet,” said Dr. Baskin. “That would be huge in the world of nanoscience.”

In addition to this research, Drs. Baskin and Didenko have also worked with the late Dr. Richard Smalley, the Nobel laureate who developed the “buckyball.” Their research focused on manipulating carbon nanotubes to create fluorescent probes, something no other researcher had ever accomplished. Drs. Baskin, Didenko, and Smalley created a way to tightly wrap a polymer material around a nanotube, like a spool of thread, allowing them to label a nanotube. This resulted in a fluorescent probe and made individual nanotubes observable by a fluorescent microscope. An article on this research, co-authored with Dr. Smalley, can be found in *Nano Letters*; 2005, Vol. 5, No. 8.

A nanometer is too small to be seen with a conventional lab microscope. It is at this size scale, about 100 nanometers or less, that biological molecules and structures inside living cells operate.

Source: Methodist Neurological Institute