Carbon Nanotubes in Microscopy and Sensor Development

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Carbon nanotubes (CNTs) exhibit unique electrical and extraordinary mechanical properties and offer remarkable potential for revolutionary applications in electronics devices, computing and data storage technology, sensors, instrumentation, and as a tip in scanning probe microscopy (SPM) for imaging and nanolithography. Thus the CNT synthesis, characterization and applications touch upon all disciplines of science and engineering.

We have made significant demonstrations in the use of nanotube tips in AFM in semiconductor metrology, profilometry and imaging of biological samples. In each case, the nanotube tip not only provides extraordinary resolution but is also found to be very robust and long-wearing. This talk will also discuss in detail a CNT-based biosensor for cancer diagnostics. The prototype sensor calls for a catheter whose working end consists of an array of nanotubes. We have identified a probe molecule suitable for leukemia. Attaching a DNA/PNA probe to the CNT array has been demonstrated. The ability of the CNT array to function as electrode in biosensors has been tested and cyclovoltametry results will be discussed.

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