

JOINT INSTITUTE FOR MOLECULAR AND NANOSCALE INNOVATION (IMNI)
AND DIVISION OF ENGINEERING

“Optoelectronic Nanoscale Probes of Individual Carbon Nanotubes”

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Abstract

We combine suspended carbon nanotube transistors with optical trapping techniques and scanning photocurrent microscopy to investigate the motion of suspended single-walled carbon nanotubes in solution. We study the movement of nanotubes by monitoring their photocurrent images and measure their thermal fluctuations by imaging microbeads that are tightly attached to nanotubes by single-stranded DNA. By analyzing their thermal fluctuations, we are able to obtain the torsional and bending stiffness of nanotubes and then calculate their diameters. We can also measure, with sub-Angstrom resolution, the effective attachment point of the microbead to the nanotube. This system offers a new platform to investigate the interface between nanotubes and individual biomolecules.

