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Imaging the response of individual carbon nanotubes to polarized light in aqueous environments BRYANT WALKER, NIST, Gaithersburg, MD, TODD BRINTLINGER, Dept. of Materials Sci. and Eng., Univ. of Maryland, College Park, MICHAEL S. FUHRER, Dept. of Physics and Center for Superconductivity Research, Univ. of Maryland, College Park, JOHN CUMINGS, Dept. of Materials Sci. and Eng., Univ. of Maryland, College Park, ERIK HOBBIE, NIST, Gaithersburg, MD — Individual carbon nanotubes are grown using chemical vapor deposition (methane-ethylene carrier gas and iron nitrate catalyst), freely suspended in an aqueous solution using a surfactant (sodium dodecyl sulfate), and imaged in an optical microscope using either fluorescent dye (PKH67 and PKH23) or intrinsic near-infrared fluorescence. Freely suspended, individual carbon nanotubes of length 1-8 micrometers show an increasing response to illuminating light as the polarization becomes parallel to tube axis. More intriguingly, some of the carbon nanotubes are found to collapse and fold under 10-30 seconds of illumination, with increasing tube length showing longer time-to-collapse. Unperturbed persistence lengths in these nanotubes are estimated to be 200-300 micrometers.

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