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$\iota$-Carrageenan as a Matrix for Carbon Nanotube Spectroscopy
WILLIAM RICE, YOICHI MURAKAMI, JUNICHIRO KONO, ECE Dept. at Rice University — We have developed films of individualized single-walled carbon nanotubes (SWNTs) for spectroscopic studies using $\iota$-carrageenan, a polysaccharide macromolecule with a double helix structure, which is extruded from red seaweed. SWNTs produced by both the HiPco and CoMoCAT methods were separated using sodium cholate surfactants and ultracentrifugation. We found that for both HiPco and CoMoCAT tubes, the introduction of $\iota$-carrageenan did not significantly affect the interband optical absorption spectrum, indicating that separation was largely maintained. Further, we show that the optical density of the film is low in the mid-infrared ($\sim$3.5 – 6 $\mu$m). This transparency is observed at temperatures as low as 4.2 K, making this film a good candidate for temperature-dependent spectroscopic studies of nanotubes. In addition, we confirmed that the polymer film transmits in the terahertz regime (.2 – .9 THz).

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