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Resonance Raman Spectroscopy of Single-Wall Carbon Nanotubes Separated via Aqueous Two-Phase Extraction J.R. SIMPSON, Towson University, J.A. FAGAN, A.R. HIGHT WALKER, National Institute of Standards & Technology — We report Resonance Raman Spectroscopy (RRS) measurements of single-wall carbon nanotube (SWCNT) samples dispersed in aqueous solutions via surfactant wrapping and separated using aqueous two-phase extraction (ATPE) into chirality-enriched semiconducting and metallic SWCNT species. ATPE provides a rapid, robust, and remarkably tunable separation technique that allows isolation of high-purity, individual SWCNT chiralities via modification of the surfactant environment. We report RRS measurements of individual SWCNT species of various chiral index including, armchair and zigzag metals. Raman provides a powerful technique to quantify the metallic SWCNTs in ATPE fractions separated for metallicity. We measure Raman spectra over a wide range of excitation wavelengths from 457 nm to 850 nm using a series of discrete and continuously tunable laser sources coupled to a triple-grating spectrometer with a liquid-nitrogen-cooled detector. The spectra reveal Raman-active vibrational modes, including the low-frequency radial breathing mode (RBM) and higher-order modes. SWCNT chiral vectors are determined from the Raman spectra, specifically the RBM frequencies and corresponding energy excitation profiles, together with input from theoretical models.

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