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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 Instiute of Standards & Technology (NIST) — We report resonance Raman Spectroscopy 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.[1] We report RRS measurements of individual SWCNT species of various chiral index including, semiconductors, 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 to 850) nm using a series of discrete and continuously tunable laser sources coupled to a triple-grating spectrometer. 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 Raman spectra, specifically the RBM frequencies and corresponding energy excitation profiles, together with input from theoretical models.

[1]J. A. Fagan, *et al.*, Adv. Mat. **26**, 2800 (2014).

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