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Direct Measurement of the Quantum Yield of Isolated Single Walled Carbon Nanotubes LISA CARLSON, TODD KRAUSS, University of Rochester — Owing to their unique optical properties, single walled carbon nanotubes (SWNTs) have received much recent attention. However, questions remain about whether the fluorescence quantum yield (QY) varies among SWNT (n, m) structures and whether the QY for isolated nanotubes differs from the ensemble. With an ensemble QY of less than 0.1%, it is surprising that single nanotube fluorescence can be detected with relatively high signal to noise. This important photophysical parameter potentially limits how SWNTs could be used for applications in biological sensing, telecommunications, displays, solar cells, and quantum optics. We will present measurements of the fluorescence QY of isolated nanotubes, measured relative to CdTe/ZnS quantum dots (QDs) using single molecule microscopy. CoMoCAT SWNTs were ultrasonically dispersed into micelles using sodium cholate surfactant in D_2O; dilute mixtures of SWNTs and QDs were then spin cast onto quartz and their fluorescence intensities were directly compared. By accounting for differences in the absorption cross sections between the systems, the SWNT QY was determined to be $\sim$2%, nearly two orders of magnitude greater than the ensemble measurement. We will report on whether the measured QY represents an intrinsic nanotube property or if it depends upon other factors such as local environment, intertube interactions, and defects.

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