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Trion Photoluminescence in Individual Single-Walled Carbon Nanotubes[1] AMANDA AMORI, TODD KRAUSS, Univ of Rochester — Recently, charge carrier doping has garnered interest as a means of modifying the optical and electronic properties of single-walled carbon nanotubes (SWNTs). Specifically, chemically doping SWNTs with extra holes has been shown to quench the bright singlet exciton feature while a red-shifted, weaker feature appears. While this feature has been attributed to formation of a positively charged exciton, or trion, it has been observed that ensemble trion PL does not follow the standard line narrowing or $T^{-1/2}$ dependence of delocalized excitons. In this presentation, we will discuss an alternative hypothesis; specifically, that this feature may arise as a consequence of recombination of an exciton at a charged defect site along the surface of the nanotube. Using scanning confocal microscopy of individual doped SWNTs at both room temperature (RT) and 10 K, we will show PL spectra and correlated intensity statistics for trions versus excitons. Spatially resolving PL from the trion for compassion to PL from the exciton at both RT and 10 K allows for a direct assessment of the localization of the trion. Localized trion PL suggests that the trion is more likely arising from exciton recombination at a charged defect and not from a three-body delocalized quasi-particle.

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