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Bundling and Electronic Effects on the BWF Feature for Doped and Undoped Carbon Single-wall Nanotubes JEFF BLACKBURN, TIMOTHY MCDONALD, CHAIWAT ENGTRAKUL, ANNE DILLON, MICHAEL HEBEN, National Renewable Energy Laboratory — In this contribution we examine the role of bundling and electronic effects on the Breit-Wigner-Fano (BWF) Raman component for dispersions of undoped and boron-doped (p-type) SWNTs in various surfactants. Interestingly, we find that the intensity of the BWF component is sensitive to the degree of SWNT debundling, solution pH, doping level, charge transfer with redox active molecules, and differences in the SWNT-surfactant interactions, all of which lead to varying degrees of charge localization at the nanotube surface. In several cases, we observe a strong BWF component in the metallic Raman spectrum even for dispersions of highly isolated SWNTs. In general, our results, coupled with results from the literature, suggest that the presence and intensity of the BWF feature is sensitive to any changes in the magnitude of dielectric screening, whether from tube-tube interactions in bundles, from charge injection or depletion, or from charge polarization from tube-molecule interactions. These results suggest that, contrary to practice in some recent studies, the existence or lack of a BWF feature should not be used alone as a measure of SWNT aggregation. They also provide information regarding the nature of surfactant-nanotube interactions, SWNT redox chemistry, and nanotube separations.

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