

Abstract Submitted
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Dependence of the Raman G' band intensity on metallicity of single-wall carbon nanotubes KI KANG KIM, Sungkyunkwan University, JIN SUNG PARK, Tohoku University, SUNG JIN KIM, HONG ZHANG GENG, Sungkyunkwan University, KAY HYEOK AN, Jeonju Machinery Research Center, CHEOL-MIN YANG, Sungkyunkwan University, KENTARO SATO, RIICHIRO SAITO, Tohoku University, YOUNG HEE LEE, Sungkyunkwan University — We report the peculiar behavior of the G'-band Raman intensity, which is dependent on the metallicity of single-wall carbon nanotubes (SWCNTs). In the metallic SWCNTs, the G'-band intensity was enhanced relative to the G-band intensity, while the G'-band intensity was suppressed in the semiconducting SWCNTs. Resonance Raman spectroscopy (using laser energies of $E_{laser} = 2.41$ eV, 1.96 eV, 1.58 eV, and 1.165 eV) showed these features on the metal-enriched and semiconducting-enriched SWCNTs samples that had been selectively separated by the nitronium ions. The metallicity dependence was explained theoretically by calculating the resonance Raman intensity within the extended tight-binding calculations. The calculated results confirm that the G'-band intensity of the metallic SWCNTs is stronger than that for the semiconducting SWCNTs because the electron-phonon matrix elements for the TO phonon at the K point is larger for metallic SWCNTs and the resonance window for E_{33}^S is larger than that for E_{11}^M .

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