Selective Removal of Metallic Single-Walled Carbon Nanotubes with Small-Diameters by Using Nitric and Sulfuric Acids

Cheol-Min Yang[†], Jin Sung Park[†], Kay Hyeok An[†], Seong Chu Lim[†], Kwanyong Seo[‡], Bongsoo Kim[‡], Kyung Ah Park[†], Seungwu Han[§], Chong Yun Park[†], and Young Hee Lee[,†]*

BK21 Physics Division, Institute of Basic Science, Center for Nanotubes and Nanostructured Composites, Sungkyunkwan University, Suwon 440-746, Republic of Korea,

Department of Chemistry, Korea Advanced Institute of Science & Technology, 373-1, Guseong-dong, Yuseong-gu, Daejeon 305-701, Republic of Korea,

Department of Physics, Division of Nano Science, Ewha Womans University, Seoul 120-750, Republic of Korea

Supporting Information-Figure S1

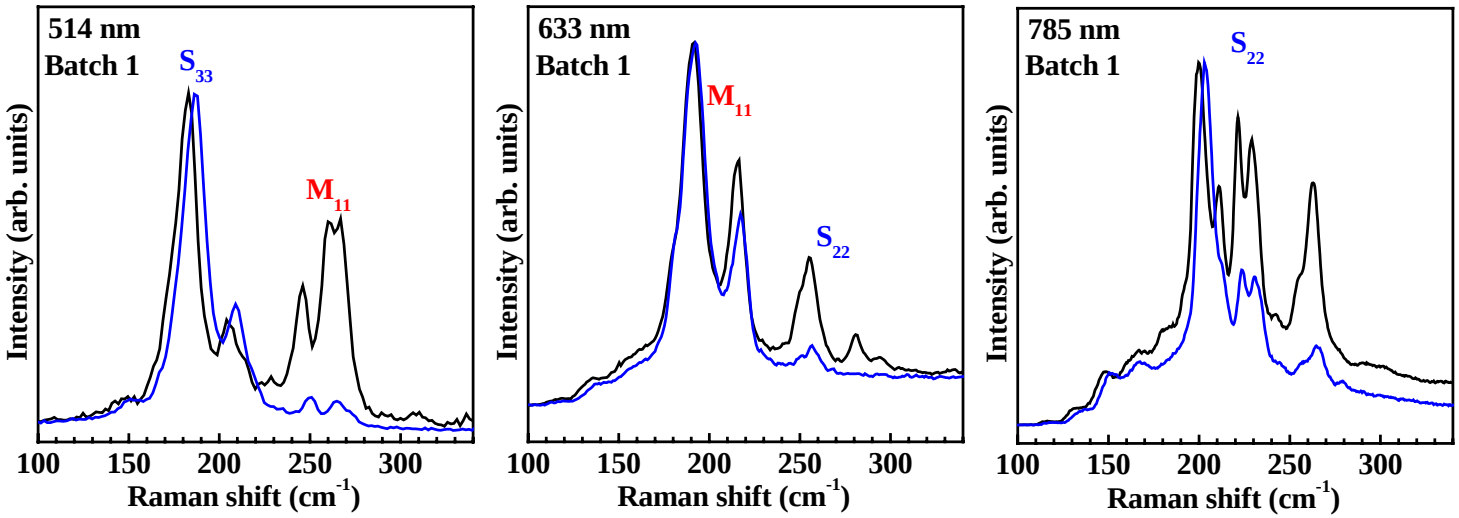

Figure S1. RBM Raman spectra for batch 1 HiPco SWCNTs at 514, 633, and 785 nm excitation wavelengths. The black and blue lines are from the pristine and air-oxidized HiPco SWCNTs (at 350 ^{o}C in air atmosphere). M_{ii} and S_{ii} correspond to metallic and semiconducting interband transitions. Gas-phase oxidation treatment led to diameter-selective removal of SWCNTs, regardless of metallicity.

Fig. S1. Yang *et al*.

Supporting Information-Figure S2

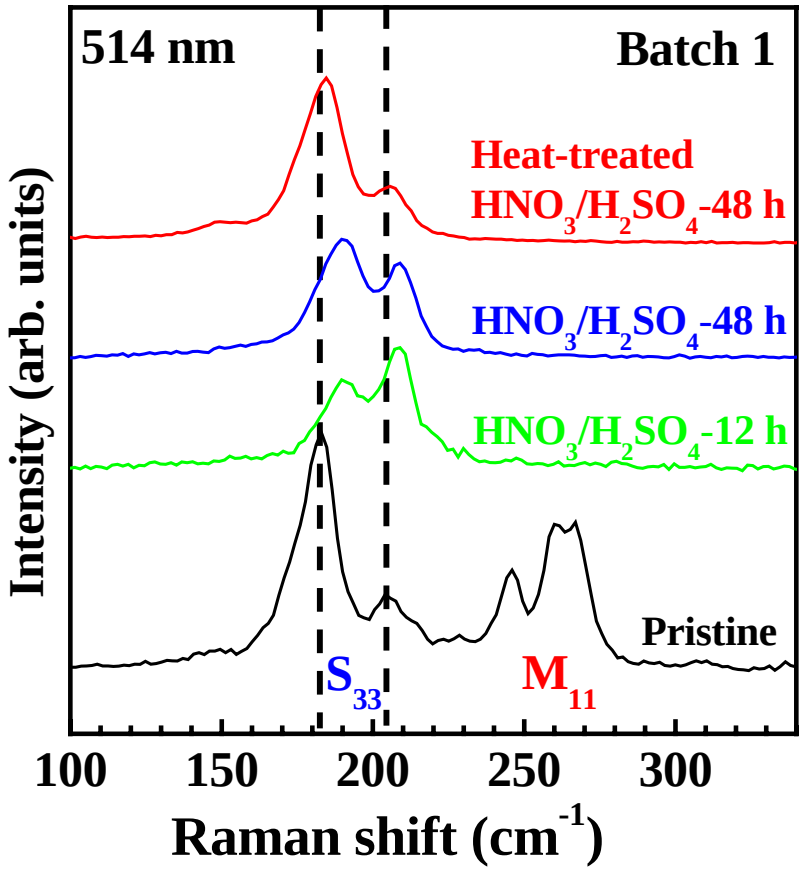

Figure S2. RBM Raman spectra from the leftover on the filter for batch 1 HiPco SWCNTs at 514 nm excitation wavelength. The black, green, blue, and red lines are from the pristine, HNO_3/H_2SO_4 (1:9) treatment for 12 h, 48 h, and HNO_3/H_2SO_4 (1:9) treatment for 48 h followed by heat treatment at 900 ^oC in Ar atmosphere, respectively. The peak shift was recovered after the heat treatment.

Fig. S2. Yang *et al*.

Supporting Information-Figure S3

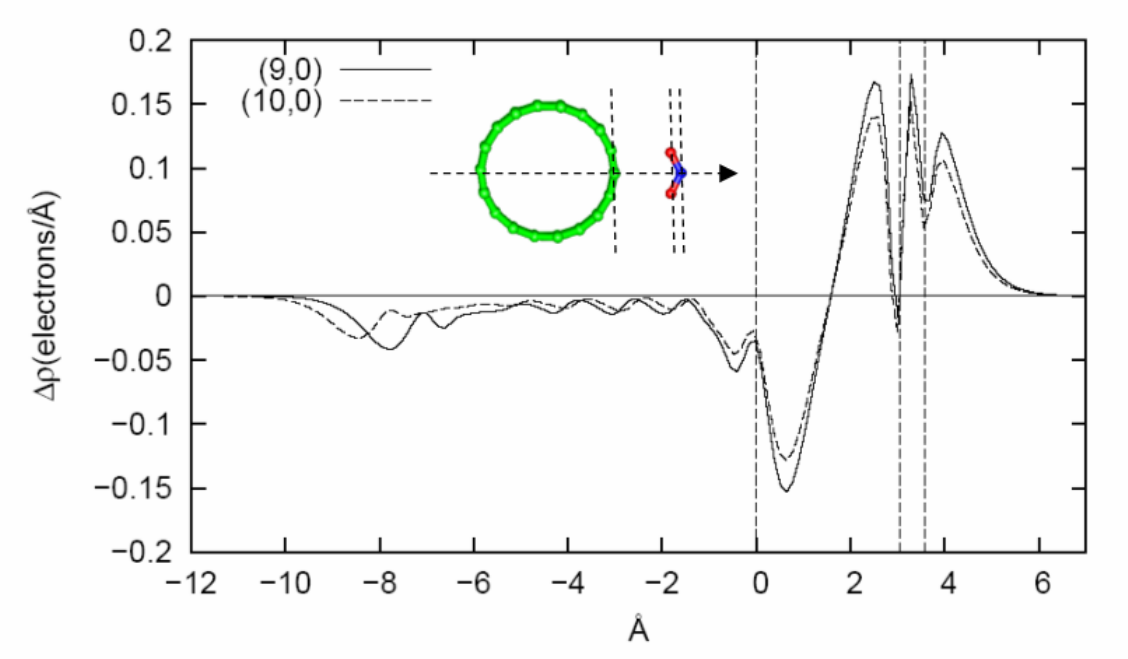

Figure S3. The redistribution of electronic density was calculated by $\Delta\rho = \rho(CNT+NO_2) - \rho(CNT) - \rho(NO_2)$.
The figure was drawn along the arrowed direction shown in the inset figure and $\Delta\rho$ is averaged over the plane perpendicular to the plotting direction. Three vertical lines in the inset and figure indicate the positions of the outermost C, O, and N atoms, respectively. The enhanced charge transfer of metallic (9,0) nanotube was clearly visible.

Fig. S3. Yang *et al*.