Electronic Supplementary Material (ESI) for RSC Advances

Polarized Raman Characterization of Arrangement of Multiwalled Carbon Nanotubes

Polarized Raman experiments in the vicinity of the D and G bands were performed on MWNT deposits at room temperature using a Horiba JY LabRam HR800 micro-Raman spectrometer and 532.155nm laser excitation.

Shown in Figure 1 are the backscattering Raman spectra for the two scattering configurations VV and VH, in which V (i.e. Vertical) and H (i.e. Horizontal) denote polarization directions for the incident or scattered light. The VV configuration indicates the paralleling incident and scattered electric field directions, while the VH one indicates the perpendicular relations between them. And the scattered light is always along the opposite direction of the incident light. Here, any four sites in the ordered region of MWNT deposits are considered. It can be seen that the intensities of the D and G bands are sensitive to the scattering geometries with the greater intensities observed for the VV polarization geometry. The great density of the D band may be resulted from the surface defects of MWNTs that were treated in nitric acid when preparing.

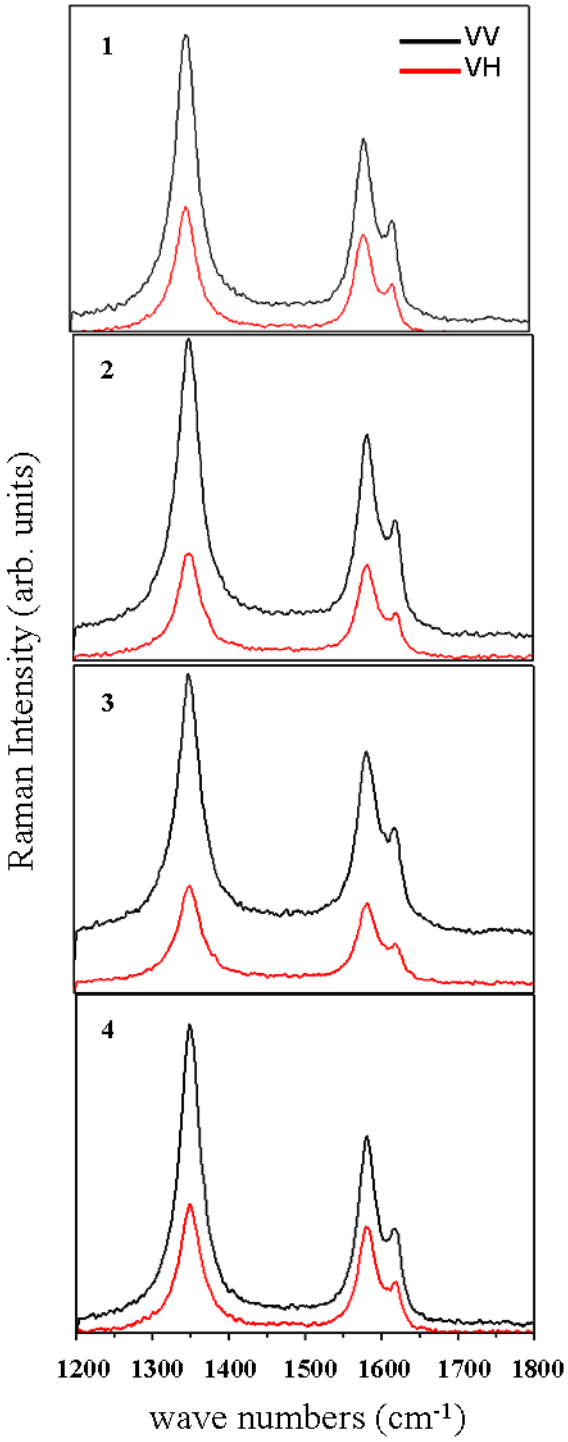

Figure 1. Polarized Raman spectra for ordered MWNTs taken at 532.155nm for two scattering geometries showing peak frequencies for the two polarizing features.

Correspondingly, we have further made a mapping scanning operation over the region including both of ordered and disordered parts, as shown in Figure 2.

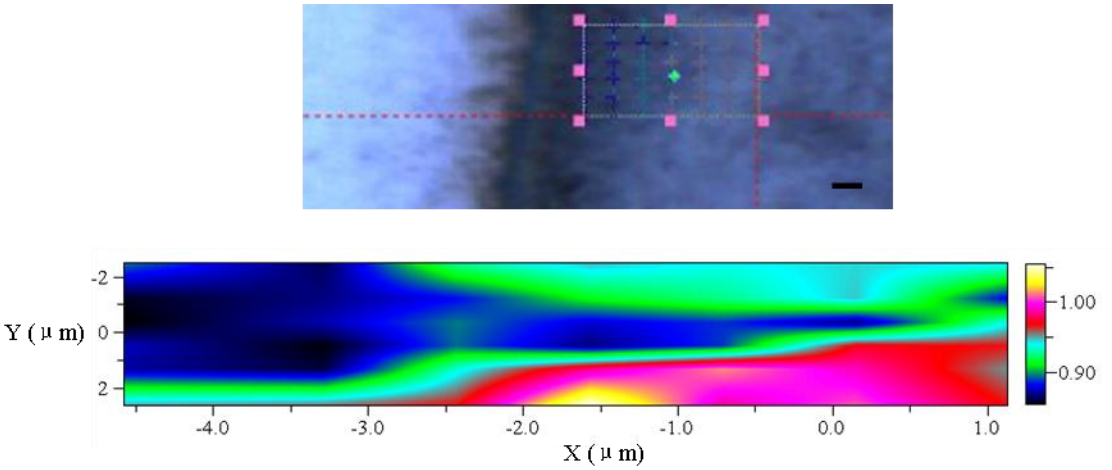

Figure 2. Map: Ratio of the intensities of the G and D bands (i.e. I_G/I_D). Top: the optical microscopy image for MWNT deposits, in which the prominent rectangular zone corresponds to the bottom mapping scanning region. And in this region the black denotes the disordered part, while the white denotes the ordered part. The scale bar expresses 1 μ m.

Figure 2 shows the area distribution of the intensity ratio I_G/I_D in the prominent rectangular zone including both of the ordered and disordered parts. The colorful intensity distribution suggests the orienting properties of MWNTs in the deposit sample to same extent. The region with greater intensity indicates the ordered part, and the disordered part corresponds to the relative lower intensity.

In all, by means of the polarized Raman technique, we have again proved the ordered structures for the MWNT deposits in our experiments.