

Temperature dependence of Raman scatterings from SWNTs

○Shohei Chiashi, Yoichi Murakami, Yuhei Miyauchi and Shigeo Maruyama

*Department of Mechanical Engineering, The University of Tokyo
7-3-1 Hongo, Bunkyo-ku, Tokyo 113-8656, Japan*

By using alcohol catalytic CVD (ACCVD) method [1], SWNTs were generated in the AFM vacuum chamber with Raman scattering measurements capabilities and real-time Raman scatterings during the whole CVD process [2]. In order to understand these Raman spectra, we measured the temperature dependence of SWNTs Raman scatterings.

Fig. 1 shows the temperature dependence of G-band shifts of various SWNTs samples. For high temperature measurements, SWNTs samples were dispersed on silicon wafers and the wafer was heated by Joule-heating (300~1000 K) in vacuum. For low temperature range, SWNTs were cooled by the helium refrigerator in a vacuum chamber (4~300 K). With increase in temperature, the G-band Raman shift continuously downshifted. In spite of the different morphology, all SWNTs samples show almost the same temperature dependence. By using the sufficiently low laser intensity, there was no damage to SWNTs or no laser heating.

Fig. 2 shows the Raman scatterings of HiPco samples at various temperatures. RBM peaks have also temperature dependence in Raman shifts and their intensity. Because of the change of resonant condition, the temperature dependence of RBM peaks in Raman shift and their intensity were very complex.

[1] S. Maruyama *et al.*, *Chem. Phys. Lett.*, **360** (2002) 229-234.

[2] S. Chiashi *et al.*, *Chem. Phys. Lett.*, **386** (2004) 89-94.

Corresponding Author: Shigeo Maruyama
E-mail: maruyama@photon.t.u-tokyo.ac.jp
Tel/Fax: +81-3-5800-6983

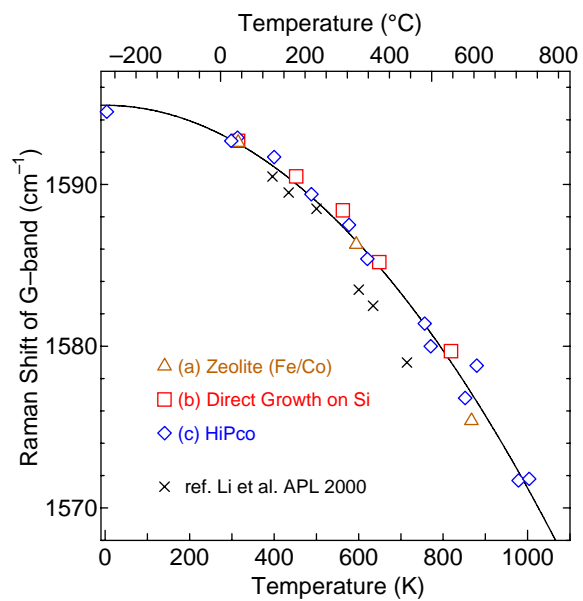


Fig. 1 Temperature dependence of the G-band Raman shift.

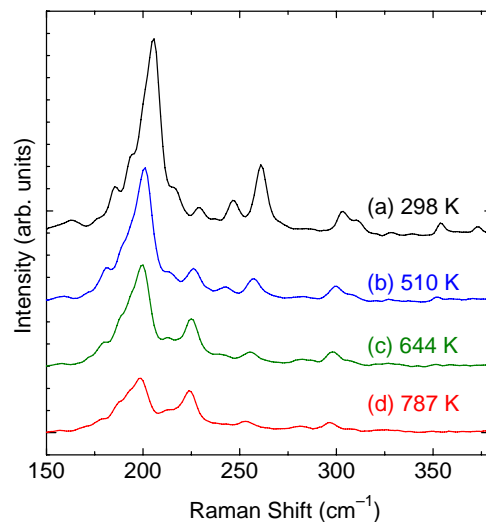


Fig. 2 RBM peaks of HiPco samples at various temperatures.