ТЕЗИСЫ ДОКЛАДОВ

INTERNATIONAL WORKSHOP
«Multiscale Biomechanics and Tribology of Inorganic and Organic Systems»

МЕЖДУНАРОДНАЯ КОНФЕРЕНЦИЯ
«Перспективные материалы с иерархической структурой для новых технологий и надежных конструкций»

VIII ВЕРСОССИЙСКАЯ НАУЧНО-ПРАКТИЧЕСКАЯ КОНФЕРЕНЦИЯ С МЕЖДУНАРОДНЫМ УЧАСТИЕМ, ПОСВЯЩЕННАЯ 50-ЛЕТИЮ ОСНОВАНИЯ ИНСТИТУТА ХИМИИ NEФТИ
«Добыча, подготовка, транспорт нефти и газа»
RAMAN SCATTERING IN C60@SWCNTS PEAPODS

1,2 Maslova O.A., 1,2 Yuzyuk Yu.I., 1,2 Barannikova S.A.
1 National Research Tomsk State University, Tomsk, Russia
2 Institute of Strength Physics and Materials Science SB RAS, Tomsk, Russia
3 Southern Federal University, Rostov-on-Don, Russia

o_maslova@rambler.ru

Raman spectroscopy is a powerful method that furnishes detailed information on various carbon allotropic forms, allowing one to distinguish them from others via a set of vibrational lines, the so-called Raman “fingerprints” [1--4]. Depending on the rolling up of a graphene (2D carbon network system), one obtains a single-walled carbon nanotube (SWCNT, 1D network system) or a C60 (0D) fullerene molecule, whose Raman spectra vary noticeably, enabling one to differentiate between these types of carbon materials.

SWCNTs can be filled with fullerene molecules, forming the so-called peapods, whose properties, such as flat conduction bands, are attractive in terms of a possible superconductivity by alkaline metal doping [5]. In this case, the Raman spectra of these systems contain the “signatures” of both SWCNTs and fullerenes, ensuring information on the type of encapsulating fullerene molecules, as well as on the diameter distribution of SWCNTs, receiving fullerenes.

In this respect, the present work aims the Raman spectroscopic characterization of a sample of C60@SWCNTS peapods, prepared via the multistep method, in order to confirm the presence of fullerene molecules (C60) inside the tubes, as well as to show the convenience of Raman spectroscopy for the non-destructive and rapid analysis of such combined-dimensionality systems. Peapods were scanned using two (514.5 and 325 nm) laser excitation wavelengths. The Raman responses of SWCNTs were distinguished from those of fullerene molecules. Furthermore, the Raman spectra of peapods, excited by a 325-nm laser beam, reveal the formation of bonds between the fullerene molecules in the nanotubes, presumably due to the laser heating (photopolymerization processes).