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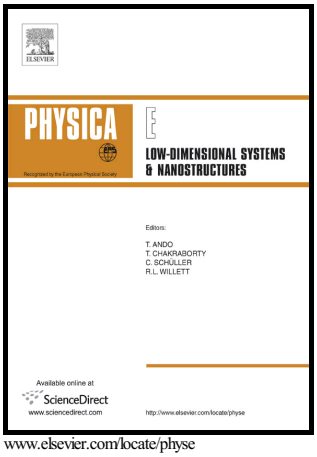

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DNA-wrapped carbon nanotubes aligned in stretched gelatin films: polarized resonance Raman and absorption spectroscopy study

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We present the study of DNA-wrapped single-walled carbon nanotubes (SWNTs) embedded in the stretched gelatin film by the polarized resonance Raman spectroscopy and visible-NIR optical absorption. The polarized dependent absorption spectra taken along and normal to the stretching direction demonstrates a comparatively high degree of the alignment of isolated SWNTs in the gelatin matrix. The analysis of Raman spectra of isolated SWNTs in the gelatin stretched films showed that the degree of the alignment of carbon nanotubes along the stretching direction is about 62%. The dependence of the peak position of G^+-band in Raman spectra on the polarization angle θ between the polarization of the incident light and the direction of the stretching of films was revealed. This shift is explained by the different polarization dependence of the most intensive A and E_1 symmetry modes within the G^+-band. The performed studies of embedded DNA-wrapped nanotubes in the gelatin film show the simple method for obtaining the controlled ordered biocompatible nanotubes inside a polymer matrix. It can be used for manufacturing sizable flexible self-transparent films with integrated nanoelectrodes.

Highlights

- The visible-NIR optical absorption spectra of DNA-wrapped single-walled carbon nanotubes embedded in the stretched gelatin film demonstrated a comparatively high degree of the alignment of isolated SWNTs.
- The analysis of the polarization Raman spectra of SWNTs:DNA gelatine film found that the degree of the alignment of carbon nanotubes along the stretching direction is about 62% related to stretching direction.
- The angular dependence of the most intensive A and E_1 symmetry modes extracted from G^+-band was revealed.

Keywords: carbon nanotube, nanotube–polymer hybrids, DNA, Raman scattering, NIR absorption.

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