

SECTION 14. ELECTRONICS AND TELECOMMUNICATIONS

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ANALYSIS OF CARBON NANOTUBEDOPED WITH FIVE PERCENT GADOLINIUM

One of the main problems facing modern science is the acquisition of new materials and their application. The study of carbon nanotubes is of great importance. For this purpose, the discovery of new smart materials, their addition with various elements is considered a priority. Carbon nanotubes, founded by S. Iijima and obtained by bending graphite in a tubular, cylindrical shape, are very interesting. In [1], the authors provided X-ray diffraction analysis, Raman scattering, and analysis of some properties of carbon nanotubes using IR luminescence. After doping with gadolinium the peak intensities in X-ray and Raman spectra drastically increase. It was found that 15% doping with gadolinium strongly affects the physical properties of carbon nanotubes functionalized by a carboxyl group. This article is devoted to the analysis of a carbon nanotube, a functionalized b-carboxyl group of a carbon nanotube and a gadolinium-doped carbon nanotube. Were analyzed the structure, purity, quality, and surface morphology, as well as the homogeneity (heterogeneity) of nanotubes. The analysis of a carbon nanotube were performed using a scanning electron microscope (SEM), energy dispersive analysis (EXD), X-ray diffraction analysis, Raman scattering, and IR luminescence. It was found that 10% doping with gadolinium strongly affects the physical properties of carbon nanotubes functionalized by a carboxyl group [2]. Some physical properties of graphene - based samples were investigated and compared [3]. In [4], a graphene - based sample was synthesized and the structural, morphological and electrical properties of the sample were analyzed and the possibilities of application were shown. Over the last 10 years, carbon nanotubes have offered a unique system for the study of Raman spectra in one-dimensional systems, and at the same time Raman spectroscopy has provided a widely used and powerful tool for the characterization of single walled carbon nanotubes (SWNTs). The 10 year history of Raman scattering in SWNTs is reviewed here and future prospects for the field are discussed [5]. Recent advances in Raman spectroscopy for characterizing graphene, graphite, and carbon nanotubes are reviewed comparatively. We first discuss the first-order and the double-resonance (DR) second-order Raman scattering mechanisms in graphene, which give rise to the most prominent Raman features. Then, we review phonon-softening phenomena in Raman spectra as a function of gate voltage, which is known as the Kohn anomaly. Finally, we review exciton-specific phenomena in the resonance Raman spectra of single-wall carbon nanotubes (SWNTs). Raman spectroscopy of SWNTs has been especially useful for understanding many fundamental properties of all sp² carbons, given SWNTs can be either semiconducting or metallic depending on their geometric structure, which is denoted by two integers (n,m) [6]. The use of Raman spectroscopy for carbon nanotube applications is presented here as a tutorial review. After introducing the relevant basic aspects of Raman spectroscopy of graphene-related materials, we will discuss how to use the Raman spectral features for practical purposes of controlling and

characterizing nanotube properties relevant for applied materials and devices. Advanced techniques with potential to enhance the relevance of Raman spectroscopy application in the carbon nanotube field are also presented [7]. Raman spectroscopy is here shown to provide a powerful tool to differentiate between two different sp² carbon nanostructures (carbon nanotubes and graphene) which have many properties in common and others that differ. Emphasis is given to the richness of both carbon nanostructures as prototype examples of nanostructured materials. A glimpse toward future developments in this field is presented [8]. This paper reports an investigation into earth metal (gadolinium) doping effects on properties of carbon nanotubes. Experimental tools were Raman scattering and IR luminescent analysis.

The paper provides analysis of Raman scattering and IR luminescence spectra. Raman analyzes of carbon nanotubes and gadolinium doped carbon nanotubes were compared and the physical properties of 5% gadolinium doped carbon nanotubes were significantly altered compared to conventional carbon nanotubes. This is due to the effect of additives and changes in carbon-carbon bonds.

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