COMPONENT HYBRIDIZATION IN THIN GRANULATED C_{60}–Cu NANOCOMPOSITE FILMS

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S u m m a r y

Thin granulated films of C_{60}–Cu nanocomposite with the Cu contents of 80, 34, and 8 at.% were fabricated with the use of the vacuum codeposition method. The films were annealed at a temperature of 473 K for 10, 20, and 30 h in vacuum. Films with lower Cu contents demonstrated a drastic relative intensity decrease and a broadening of the $A_g(2)$ dipole-active vibrational band in the Raman spectrum, which is sensitive to the charge transfer from metal atoms to C_{60} molecules. Further annealing was accompanied not only by a decrease of this band intensity, but also by an intensity increase and a broadening of the $H_g(8)$ vibrational mode band. Moreover, annealing gave rise to the growth of the triplet radiation emission intensity. Similar processes, but with some delay, also occurred in a granular film with a higher copper content. The transformation of Raman and photoluminescence spectra evidenced the polymerization and the destruction of C_{60} molecules owing to the diffusion of copper atoms into C_{60} crystallites, followed by the chemical interaction between those two components due to the charge transfer from metal atoms to fullerenes.