Nanostructured surfaces
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Nanotechnology and nanotructured surfaces of heterosystems with C_{60} fullerene, other carbon and metallic phases
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New carbon structure (carbon like and diamond like) has been prepared from fullerene C_{60} under high pressures and temperatures. In this work the films were obtained onto non-heated Si substrates from C_{60} molecular beams by evaporation of microcrystalline C_{60} powder in vacuum at pressure of 10^{-4} Pa from effusion tantalum cell with temperature of 650 to 950 K. The films thickness was from 0.1 to 2 μkm. To analyze of the films structure and composition was used Raman spectroscopy. The film surfaces was studied using atomic force microscopy with a Nanoscope III – a operating in the periodical mode. At the low evaporation temperature of fullerene C_{60} forms nearly ideal molecular films with the molecules bound by van derWaals-interactions. Raman spectra C_{60} films display lines peaked at 1425, 1470 and 1575 cm^{-1}. The films surface was homogeneous and smooth enough. The altitude of a grain does not exceed 20 nm. The films structure changed drastically, when their velocity grown risen. Fullerene molecules decomposed and new carbon structures (C_{60}:C, C:C_{60} and a-C) form in the films depending on the C_{60} beam energy. In Raman spectra was observed two broad bands at 1400 cm^{-1} and 1600 cm^{-1} (D-band and G-band, respectively). The films surface was not smooth and inhomogeneous. Composite nanostructures with C_{60} fullerene and metallic phases were obtained simultaneously from two independence evaporation sources: C_{60} and Ti, Cu, Al or Sn. The surface nanomorphology of such composite films were determined of the metallic phases type and hers quantity. At the low (smaller 20 %) of C_{60} concentration were observed big metallic grains from 50 to 200 nm depending of metal type.