Nanocomposites and nanomaterials.

Magnetic properties of nanocomposite multilayer structures $As_{40}S_{60}$:Mn–Se

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In present work properties and the direct one-step relief formation with the use of amorphous composite chalcogenide nanomultilayers structures $As_{40}S_{60}$:Mn–Se were studied. Composite nanomultilayer structures were prepared by cyclic thermal vacuum deposition from two isolated boats with $As_{40}S_{60}$:Mn and Se chalcogenides on constantly rotated glass substrate at room temperature in one vacuum deposition cycle with thickness of $As_{40}S_{60}$:Mn of 8-15nm and Se – 10-15nm. The total number of nanolayers was ~200. Diffraction gratings were recorded using 532nm wavelength with synchronous diffraction efficiency measurement in first diffraction order using 650nm wavelength. Recording process depended on the polarization of recording light beams. Local magnetic properties of the surface relief gratings which were fabricated using As_2S_3:Mn-Se multilayer nanostructures were investigated using gradient magnetic force microscopy (MFM). MFM measurements were carried out using scanning robe microscope NanoScope IIIa Dimension 3000 with the use of two-scan method.

AFM and MFM images show that distribution and value of magnetic field (fig.1b) correlates with gratings relief in counter phase (fig.1a). If magnetization direction of tip is changed grating relief profile and profile of MFM signal are in phase.

a b

MFM diagnostics has shown that small periodical relief thickness changes leads to the essential fluctuations of magnetic field value over the relief surface. Thus, for the first time possibility of direct one-step magnetic relief formation using $As_{40}S_{60}$:Mn–Se composite nanomultilayer structures was shown.

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