

Formation of carbon microstructures by dry electron-beam lithography

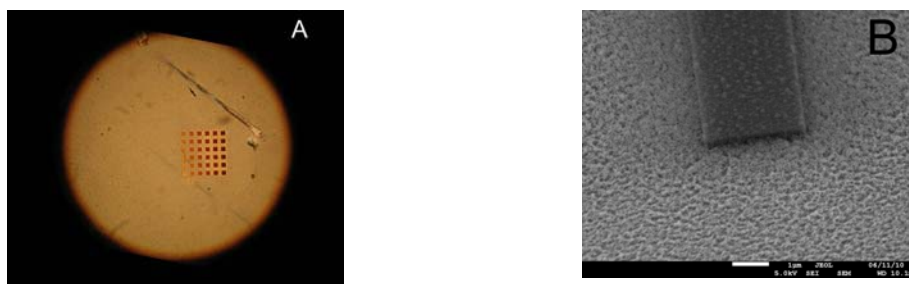
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Electron-beam lithography is one of the widely spread techniques in micro- and nanoelectronics. Revealing transformation of fullerite C₆₀ films under electron irradiation into weakly evaporable substance [1] led to the idea of dry lithography with all operations performed at high vacuum [2]. This idea was confirmed by creation of latent image of macrosized low-energy electron beam and their developing by heating in vacuum. The aim of the work was to confirm the possibility of dry electron lithography by fabrication of carbon microstructures at the conditions typical for usual electron-beam lithography. Latent 2 μm micropatterns with a shape of squares and stripes were created in fullerite film of 320 nm thickness by 25 keV electron nanoprobe and then developed by heating in vacuum. The e-beam writing of the micropatterns and their visualization were realized by Scanning Electron Microscope (SEM) - JEOL JSM-7001F equipped with lithographic tool “Nanomaker” (“Inteface Ltd.”, Moscow). Visual examination of the samples by optical microscope (Nikon Eclipse 150) revealed the designed structure after heating (Fig. A). Fig. B shows the developed SEM image of stripe. The obtained results confirmed the possibility of carbon microstructure fabrication by dry electron lithography.



Optical (Fig. A) and SEM (Fig. B) images of carbon microstructures.

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[1] V.M. Mikoushkin, V.V. Shnitov, *Phys. Solid State* **39**, 164 (1997).

[2] V.V. Shnitov, V.M. Mikoushkin, Yu. S. Gordeev, *Microelectron. Eng.* **69**, 429 (2003).