

Application of scanning probe microscopy in the research of opal nanostructures

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The article describes the results of the research of formation of multilayer structures based on opal films, using scanning probe microscope Solver P-47 by means of atomic force and tunneling microscopy and current spectroscopy. The research shows that tunneling microscopy methods are suitable for studying chromium-opal-gold-carbon layered structures. Surface images and current-voltage characteristics of each layer obtained in the process of forming structures are shown. Results suggest that the formation of film structures on the surface of opal matrices begins with the formation of “islands” on tops of silica spheres. Findings of the research show that the deposition of carbon films on the surface of the chrome-opal-gold structure results in tunnel current increase in the probe-sample gap. The presented results can be used in the development of technology for the formation of various layered structures on the surface of opal matrices, in particular, in the production of photonic devices, sensors and emission devices.

Keywords: *opal, opal matrix, thin films, carbon structures, vapor-phase deposition, scanning probe microscopy, tunnel electron microscopy, current spectroscopy*

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