

5 Nm Structures in Fluorescent Photosensitive Glass-Ceramic Produced by Direct Laser Writing

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In this paper we present structural and optical properties of the fluorescent photosensitive glass-ceramics [1] doped with Sm. The properties were investigated by HRTEM and optical absorption spectroscopy. An application was dedicated to the recording of silver nanocrystal lines inside material by laser irradiation of a home built dynamic tester. 3D nanostructures produced by Direct Laser Writing could be useful for design and fabrication of 3D optical memory devices with an ultrahigh storage density [2-4], nanolithography, metamaterials, 3D photonic crystals in visible range, and plasmonic devices.. Using low power laser pulses and an adequate aperture of focusing lens, lines with 5 nm in diameter (Fig. 1) were written.

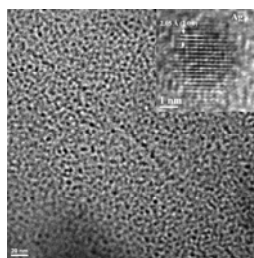


Figure 1. HRTEM image of a silver nanocrystal line. Upper right insert presents the image of (2 0 0) lattice planes of a FCC silver nanocrystal.

A new fluorescent photosensitive glass-ceramic with Sm has been developed. Lines having an average width of 5 nm were produced, without annealing process, by a home built dynamic tester, using a low power laser. Measurements carried out by HRTEM sustain the presence of silver nanocrystal lines. 3D nanostructures realized in fluorescent photosensitive glass-ceramics, by Direct Laser Writing could be useful for design and fabrication of 3D optical memory devices with an ultrahigh storage density, nanolithography, metamaterials, 3D photonic crystals in visible spectral range, and plasmonic devices.

References

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