

Applied Physics A: Materials Science and Processing 2013 vol.111 N1, pages 261-264

Synthesis of periodic plasmonic microstructures with copper nanoparticles in silica glass by low-energy ion implantation

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Abstract

Ion implantation was used to locally modify the surface of silica glass to create periodic plasmonic microstructures with Cu nanoparticles. Nanoparticles were synthesized by Cu-ion irradiation of the silica glass at the ion energy of 40 keV, dose of 5×10^{16} ions/cm² and current density of 5 μ A/cm². This procedure involves low-energy ion implantation into the glass through a mask placed at the surface. Formation of nanoparticles was observed by optical spectroscopy and atomic force microscopy. The presented results clearly demonstrate how the low-energy ions can be used for the fabrication of photonic microstructures on dielectric surfaces in a single-step process. © 2012 Springer-Verlag Berlin Heidelberg.

<http://dx.doi.org/10.1007/s00339-012-7474-5>
