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Laser annealing of metal nanoparticles implanted in dielectrics

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Abstract

The interaction of excimer laser pulses with silica consisting ion-synthesized copper nanoparticles is studied. Using optical reflectance of composite layers it is established that at the initial stage laser annealing leads to the fragmentation of the nanoparticles to smaller ones. After continuous irradiation by several pulses, the nanoparticles become larger due to the heating of the surrounding glass. The laser treatment for a longer time (more than several tens pulses) results in the dissociation of nanoparticles into small clusters and individual atoms. The mechanisms responsible for the modification of the composite material under high power laser radiation are discussed. © 2011 Copyright Society of Photo-Optical Instrumentation Engineers (SPIE).

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Keywords

Ion implantation, Laser annealing, Metal nanoparticles, Surface plasmon resonance