

# Shape deformation of embedded metal nanoparticles by swift heavy ion irradiation

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## ABSTRACT

Swift heavy ions (SHI) induce high densities of electronic excitations in narrow cylindrical volumes around their path. These excitations have been used to manipulate the size and shape of noble metal nanoparticles embedded in silica matrix. Films containing noble metal nanoparticles were prepared by magnetron co-sputtering techniques. SHI irradiation of films resulted in the formation of prolate Au and Ag nanoparticles with major axis along the ion beam direction. It has been observed that the nanoparticles smaller than the track size dissolve and other grow at their expense, while the nanoparticles larger than track size show deformation with major axis along the ion beam direction. The aspect ratio of elongated nanoparticles is found to be the function of the electronic energy loss and ion fluence. Present report will focus on the role of size and volume fraction on the shape deformation of noble metal nanoparticles by electronic excitation induced by SHI irradiation. The detailed results concerning irradiation effects in silica-metal composites for dissolution, growth and shape deformation will be discussed in the framework of thermal spike model.

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