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Investigation of swift heavy ion induced modifications of size of embedded Au nanoparticles by atomistic simulations

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Nanometer-sized noble metallic particles embedded in dielectric matrices have attracted a great deal of attention. They are used in many applications mostly due to surface plasmon resonance which has dependence on their size and shape. Therefore, efforts have been made to vary their size and shape by various methods during or after fabrication. Swift heavy ion irradiation has been found to be very useful in this objective [1-3]. It has been shown that the size and shape of nanoparticles can be varied depending on the particle size and the expected size of the ion tracks in the matrix [4]. In particular, swift heavy ion irradiation has been recommended as size filter to embedded noble nanoparticles [5]. Our group has proposed a model based on inter-particle separation to explain the swift heavy ion induced modification in the size of embedded nanoparticles smaller than the ion track size in matrix [4]. In the present work, we have tested this hypothesis by atomistic simulation and tried to gain a better understanding of nanoparticle size modification pathway. The size of nano-particles and inter-particles separation, kept in the simulation, were taken from the experimental work [4]. Effect of ion irradiation was mimicked by considering local short-time heating effects. The results agree with the experimental results of growth or reduction of embedded nanoparticles depending on the inter-particle separation.

References:

- [1] Y.K. Mishra, D. Kabiraj, D.K. Avasthi, J.C. Pivin, Radiat. Eff. Defects Solids, 162, 207 (2007).
- [2] Y. K. Mishra, D. K. Avasthi, P. K. Kulriya, F. Singh, D. Kabiraj, A. Tripathi, J. C. Pivin, I. S. Bayer and A. Biswas, 90, 073110 (2007).
- [3] F. Singh, S. Mohapatra, J.P. Stoquert, D.K. Avasthi, J.C. Pivin, Nucl. Instr. and Meth. B, 267, 936 (2009).
- [4] D.K. Avasthi, Y.K. Mishra, F. Singh, J.P. Stoquert, Nucl. Instr. and Meth. B, 268, 3027 (2010).
- [5] Y. Yang, C. Zhang, Y. Song, J. Gou, L. Zhang, Y. Meng, H. Zhang, Y. Ma, Nucl. Instr. and Meth. B, 308, 24 (2013).

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