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Cluster Growth Mechanism in Sputtering Gas-Aggregation Nanocluster Source M. TARSEM SINGH, H. HAN, J.A. SUNDARARAJAN, Y. QIANG, Physics Department, University of Idaho, Moscow, Idaho 83844 — We have studied the influence of some parameters for cluster growth of core shell iron-iron oxide magnetic nanoparticles (MNPs). The nanocluster source which combines a magnetron sputtering gun with a gas aggregation chamber is used to produce MNPs. Nanoclusters of various mean sizes ranging from 1-100 nm can be synthesized by varying the aggregation distance, Ar to He gas ratio, pressure in the aggregation tube, sputter power, and temperature of the aggregation tube. Physical properties – magnetic measurements by VSM and SQUID and size distribution by SEM and TEM were studied for different MNPs. The significance of this research is to understand the growth mechanism and physical properties as the size of particles grow from few nanometer to hundred of nanometer. Growth of the particles is theoretically explained by the homogenous and heterogeneous growth process. Based on this study, different size of MNPs fits into different category of applications from data storage to biomedical field.

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