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Cluster Beam Synthesis of Magnetic Nanoparticles R.H. KODAMA, J.J. KAVICH, M. VEDPATHAK[1], M.C. PETERSON, Univ. of Illinois at Chicago — Highly mono-dispersed Ni and Fe nanoparticles are produced using a cluster beam source. The source chamber is isolated from a deposition chamber using a small orifice. By balancing process gas flow, orifice size, and pumping speed we can create a high-pressure sputtering environment, suitable for nanoparticle condensation. The average beam flux and a spatial beam profile are acquired using a quartz crystal monitor with linear motion control. We find that the time stability of the nanoparticle flux is very sensitive to sputtering power and temperature gradients in the cluster source. AFM and TEM measurements have shown a correlation of particle size with position in the beam. Both size distribution and time stability seem to be sensitive to small perturbations in the gas flow near the sputtering source. High-Resolution TEM images indicate that the particles are randomly oriented and nano-crystalline in nature. The magnetic properties of Ni nanoparticles are measured using a SQUID magnetometer.

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