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Magnetic Properies of Ni Nanoparticles Used for Carbon Nanofiber Synthesis[1] K. D. SORGE, O. MALKINA, C. FINKEL, Florida Atlantic University, J. D. FOWLKES, P. D. RACK, University of Tennessee, K. L. KLEIN, A. V. MELECHKO, M. L. SIMPSON, Oak Ridge National Laboratory
— Magnetic properties of Ni catalyst particles used for vertically-aligned carbon nanofiber (VACNF) synthesis are investigated. Ni thin films are deposited on Si wafers by sputter-depositing to thicknesses of 2–10 nm. The VACNFs are then grown in a Plasma-Enhanced Chemical Vapor Deposition (PECVD) chamber with NH_3 and C_2H_2 at relative flow rates of 80/40 sccm, respectively, a pressure of 3 Torr, and a temperature of 700°C. The catalyst particles, after nanofiber growth, are 10–150 nm in diameter. Magnetic properties are investigated by SQUID magnetometry in applied magnetic fields of $|H| < 10$ kOe and temperatures $T = 5$–300 K. The catalyst particles are ferromagnetic with low coercivity and remanence. The ferromagnetic properties are thermally stable up to room temperature in all but the smallest particle sizes. Saturation magnetization is much less than would be expected from the deposited quantity of Ni metal.

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Korey Sorge
Florida Atlantic University

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