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Magnetization and Resistivity Study of FCC γ -Fe Precipitates in Cu JOSEPH BUDNICK, WILLIAM HINES, ROBERT MILLER, DOUGLAS PEASE, DAVID PERRY, POORANI SHANTHAKUMAR, Department of Physics, University of Connecticut, Storrs, CT 06269-3046 — Magnetization and resistivity measurements on two samples of Cu + 2.0 at.% Fe are reported here. The first sample, prepared by annealing at 950 °C for 2 days followed by rapid quenching, consists of a random solid solution of Fe in Cu. The magnetization follows the Curie-Weiss law $10 \text{ K} \leq T \leq 300 \text{ K}$ yielding an effective Fe moment of $1.9 \mu_B \pm 0.1 \mu_B$ and Curie temperature of $-2.0 \text{ K} \pm 2.0 \text{ K}$. The second sample, prepared using the heat treatment above followed by a second annealing at 620 °C for 2 hours, consists of face-centered-cubic γ -Fe precipitates in the Cu matrix. Evidence is given for an antiferromagnetic ordering occurring in this sample with a Neel temperature $\approx 55 \text{ K}$. The magnetization follows the Curie-Weiss law $100 \text{ K} \leq T \leq 300 \text{ K}$ yielding an effective Fe moment of $1.8 \mu_B \pm 0.2 \mu_B$ and a Curie temperature of $-58 \text{ K} \pm 10 \text{ K}$. Resistivity measurements are also presented which assist in describing the structural nature and relevant magnetic interactions for these two samples.

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