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Electrodeposition and Characterization of Thin Films Created for Giant Magnetoresistance[1] ALYSSA FREY[2], NICHOLAS WOZNIAK, JENNIFER HAMPTON, Hope College — Giant magnetoresistance occurs when a nonmagnetic thin film is sandwiched between two magnetic films. In the presence of an external magnetic field, the magnetic films align, allowing increased current flow. Electrodeposition was used to deposit nickel-iron and copper films from sulfate solutions containing 100 mM nickel, 10 mM iron, and 1 mM copper onto gold-plated silicon wafers. Particle induced x-ray emission (PIXE) and atomic force microscopy (AFM) were used to study how the deposition time and deposition potential affect the composition and surface roughness of the deposits. PIXE analysis showed that at less negative potentials, the deposit is dominated by copper, and at more negative potentials, the deposit has a greater nickel and iron concentration. The ratio of iron to total magnetic material changes with varying potential and reaches a maximum value at -900 mV. Analysis of RMS roughness from the AFM data for varying length scales reveals the fractal nature of the deposits below a characteristic length.

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