

## **Timothy Boman and John Ouma**

Mentor: Dr. Jennifer Hampton

Department of Physics

### **Electrodeposition and Characterization of Nickel, Iron, and Permalloy Thin Films**

Magnetic and non-magnetic thin films are widely used in the storage and reading of computer data. Electrodeposition is a relatively cheap and easy method of producing thin films. The purpose of this ongoing project is to perform electrodeposition of nickel, iron, and permalloy (a mixture of nickel and iron) thin films. The films were deposited on gold-plated silicon wafers, and their composition and morphology were studied using atomic force microscopy (AFM), Rutherford backscattering spectrometry (RBS), and particle-induced x-ray emission (PIXE). AFM revealed the surface morphology of the films, while RBS and PIXE were used to determine film thickness and elemental composition respectively. The effects of deposition potential, duration of deposition, and solution composition were explored. Films that were thicker tended to be rougher than thinner films. PIXE analysis showed that permalloy samples produced from solutions with high nickel concentrations had a greater proportion of iron than was in solution.

This material is based upon work supported by the National Science Foundation under NSF-REU Grant No. PHY-0452206, the Hope College Dean for the Natural and Applied Sciences Office, and the Midstates Consortium for Math and Science.