**229g Electrodeposition of Fepd Alloy Thin Films and Nanowires**

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FePd alloys are of great interest because of their unique magnetic and material properties. FePd alloys have been found to exhibit giant magneto-restriction properties due to martensitic transformation when induced by a magnetic field, which make the FePd alloy a good candidate material for magnetically driven sensors and actuators. In addition, Pd based materials have been used as a model metal for studying hydrogen absorption and are expected candidates for hydrogen sensor applications. In this work FePd thin films and nanowires were electrodeposited from ammonium citrate baths where the effects of various deposition conditions, such as pH, current density, and bath compositions, on physical properties such as material and magnetic properties, were systematically analyzed. Total metal ion concentration of the baths was kept constant at 0.02M, while the concentration of palladium in the bath was varied from 0.002 to 0.008 M. The pH and current density were varied from 8.5-10.5 and 1-25 mA/cm2, respectively. It was found that the deposited palladium content (at %) of the thin films decreased from 75% to 21% with increased current density from 1 mA/cm2 to 25 mA/cm2. High film stress was observed on films deposited from solution baths with high Pd content, which caused cracks of deposited FePd thin films. Based on thin film studies, 25Fe75pd nanowires were fabricated using template directed methods of various diameters, e.g. 30 nm and 200 nm. The 25Fe75Pd nanowires were magnetically aligned to prefabricated micro-ferromagnetic electrodes in order to integrate and utilize the nanowires into hydrogen sensor devises. Electrical and hydrogen sensing parameters of FePd nanowires were determined as function of nanowire diameter and composition.