

## **Pulse-plated Cu-Ni alloys, multilayers and nanowires**

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We have used computer-controlled pulse-plating to prepare a wide variety of magnetic Cu-Ni alloys, multilayers and nanowires. The electrolyte used is dilute in Cu and highly concentrated in Ni, and depending on the applied potential may be used to deposit either pure Cu or a Ni-rich alloy. We alternate the deposition between these two materials, continuously monitoring both the Cu and Ni partial currents (under the assumption that Cu deposition is always diffusion-limited). When the switching rate is low, the result is a conventional Ni-Cu/Cu multilayer, but when the amount of each component deposited per cycle is less than a monolayer, the result is a (heterogeneous) alloy. This procedure has been applied successfully to nanowires (using track-etched polycarbonate membranes as templates) as well as to large-area films.

Since the magnetic properties of Cu-Ni alloys are extremely sensitive to their composition, magnetic measurements may be used to evaluate the compositional uniformity of the films. These measurements give particularly interesting results close to the transition from multilayer to granular alloy.

If time permits, we will also present results on the effects of an applied magnetic field on film morphology.