Effect of organic additives on electrodeposited Cu-Ni thin films

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Organic additives have a profound impact on electroplating. They can change material properties of deposited metals such as grain size and crystalline orientation. Various organic reagents work as accelerators and suppressors for deposition of copper and nickel, respectively. We have investigated change of magnetic properties of electrodeposited thin films of copper, nickel and their alloys caused by addition of various organic additives in the plating baths. An accelerator for Ni changes the crystalline orientation of plated Ni film from (200) to (111) significantly while a suppressor has smaller effect. On the other hand, additives for Cu do not show an appreciable change of crystalline orientation in Cu films. While most additives for copper have no effect on nickel deposition, a few work as an accelerator and suppressor. Similar behaviour could also be observed in nickel additives on copper plating. By using proper additive composition and concentration, we could alter properties of co-deposited Cu-Ni films without changes of other plating parameters such as electrolyte composition, plating current, voltage and time. Grain size and crystalline orientation also could be changed in a continuous matter and, as a result, the magnetic properties could be controlled. We have observed changes in coercivity, remnant field, and saturation magnetization solely by introduction of the organic additives in plating electrolytes. This is due to the change of crystalline anisotropy between easy and hard axes of Ni.

References

[1] V.M. Dubin, Kimin Hong, and N. Baxter, "Electroplating bath composition," U.S. Patent No. 6,491,806
[2] L. Oniciu and L. Muresan, *J. Appl. Electrochem.***21** 565 (1991)
[3] A. R. Despic, Deposition and Dissociation of Metals and Alloys, Part B in "Comprehensive Treatise of Electrochemistry," Vol. 7, Plenum, New York (1983)
[4] R. Weil and R. A. Paquin, *J. Electrochem. Soc*, **45** 229 (1924)
[5] Ilsu Rhee and Kiwon Yang, *J. Korean Phys. Soc.* **37** 360 (2000) and references therein.