

Electrocrystallization of cellular Co films

L.Cattaneo, S.Franz*, M.Bestetti, A.Vicenzo, P.L.Cavallotti

Politecnico di Milano
Dipartimento di Chimica, Materiali ed Ing.Chimica
Via Mancinelli, 7 - 20131 Milano
Tel. +39 02 23993150 Fax. +39 02 23993180

Cellular coatings consist in mono-oriented columnar grains with nanometric diameter (about 50 nm) separated by a non-metallic segregation compound at the grain boundary. The interest towards this class of coatings arises from the possibility to create voids between the metallic pillars by selective chemical etching, so that a nanostructured porous structure can be obtained on the surface, which can be further functionalized.

Such coatings can be obtained by electrocrystallization when a strong inhibition is present at the growth front. In the present study, structure, morphology and electrokinetics in electrocrystallization of cellular Co films are described.

Cellular electrodeposition of Co films was carried out on Cu (111) and Cu(111)/NiP substrates from 1M $\text{Co}(\text{NH}_2\text{SO}_3)_2$ at pH 6 using a rotating disk electrode, in both potentiostatic and galvanostatic conditions. The crystallographic structure and preferred orientation of the electrodeposited Co layers were correlated to the deposition parameters (polarization potential, deposition current density, rotation speed and grain size) and to the electrokinetic behaviour. The effect of additives (such as BTA and NaH_2PO_2 .) on the electrocrystallization process was investigated, with particular regard to the crystallographic structure of the electrodeposited layer. Magnetic properties were correlated to crystal structure and morphology.

*Reference author: silvia.franz@polimi.it