

SHAPE AND STRUCTURE EVALUATION OF COPPER CRYSTAL ELECTRODEPOSITED IN DIFFERENT MAGNETIC FIELD

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In this paper, process of electro-deposition of diamagnetism metal-copper was investigated under the condition of zero, weak and high static magnetic field. Effect of magnetic flux density (MFD), current density and both direction of current and magnetic field on the crystal shape and structure as well as cathode electric current efficiency was discussed, and following results were obtained,

1. In zero magnetic field, the surface of electro-deposited copper crystal showed the shape of pyramid. With increasing current density, size of pyramid crystal increased first, then lost the shape and showed fine shape of soil.
2. In weak magnetic field (MFD<1Tesla, and $B \perp J$), the surface showed the shape of cystiform crystal, and the crystal became smaller whenever increasing current density or MFD.
3. When B was parallel to J, the shape of copper surface would change from pyramid to smooth cobblestone with increasing current density; while increasing MFD would lead to the appearance of taper tower-like crystal and sphere crystal.
4. In high static magnetic field with MFD equal to 10Tesla, even increasing current density, shape of copper deposition layer always had the appearance of pyramid, and big pyramids would be obtained. However, the crystal size in the cross section would decrease sharply.
5. The cathode current efficiency would decreased both in weak and high static magnetic field with B perpendicular to J ;

The structure of deposited copper under different condition was studied by X ray diffraction method, and the mechanism of magnetic field affecting the mass transferring in aqueous and the growth process of electric crystallization was considered from dynamical aspect.