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Age Softening Phenomenon at Room Temperature of Electrodeposited Copper Plating Film for Gravure Cylinder

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Abstract

The age softening phenomenon at room temperature that the copper electrodeposits obtained from a copper sulfide plating solution containing a hardener was studied using hardness and SIM measurements. The surface crystal orientation of the electrodeposits was examined by XRD and the determination of impurity atom in the electrodeposits was examined by the combustion method. It was found that the hardness fall according to the increment of the grain size by self-annealing. This phenomenon is called the "age softening" in this paper. The age softening could be inhibited by adding a polymer containing nitrogen in a concentration of more than 50mg/L to the plating solution. It was suggested that the inhibition of the age softening phenomenon is attributable to the amount of impurity (ex. hydrogen atom) in the electrodeposits. At the present the mechanism for this phenomenon has not be completely understood. Adding the polymer containing nitrogen weakened the orientation 100 of electrodeposits. The grain growth of crystal on the surface perpendicular to the <100> direction was observed by the age softening.

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