Cu–Mo Thin Film Electrodeposited at a Rate of Megahertz by a Rectangular Pulse Current Technique

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Cu-Mo thin films generated on ITO glasses by a rectangular pulse current technique having a frequency of megahertz were investigated using energy dispersive X-ray spectroscopy (EDX), X-ray diffraction (XRD), and scanning electron microscope (SEM). The concentration of Mo in the Cu-Mo thin film measured with EDX, which periodically changed with the frequency of the rectangular pulse current, had a maximum concentration of 9 wt%. XRD analysis revealed diffraction peaks of the Cu-Mo thin film consistent with those of the crystallographic planes such as (111), (200), (220), (311), and (222) planes of polycrystalline copper. SEM images of the Cu-Mo thin film showed an aggregation of an island of which the surface appeared like a cauliflower in nano scale size. These experimental results indicate that the Cu-Mo thin film generated in an aqueous solution that does not include the iron-group element is an alloy composed of Cu and Mo. The oscillatory behavior of the Mo concentration in the Cu-Mo thin film is explained by an energy level transition of electron that causes a resonant generation of Cu and Mo.

Keywords: Cu-Mo thin film; Aqueous solution; Energy level transition; Nano cauliflower; Resonant generation; Alloy

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