Generation of Sn Whiskers During Electrodeposition

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Sn whiskers generated during electrodeposition on a Cu plate within a range of the deposition temperature from 273 to 303 K were investigated using scanning electron microscopy and X-ray diffraction. The critical film thickness for the formation of Sn whiskers on a Sn thin film was determined (1.9 μm). The critical film thickness was found to be independent of the deposition temperature. At the film thicknesses more than 5 μm , the (220) dominant crystallographic plane transformed the (112) plane parallel to the Cu plate. This can be attributed to the morphological change (coarse to dense Sn whiskers). This suggests that the Sn whiskers with the (220) plane acted as crystal seeds to generate the Sn whiskers with the (112) plane. The fine string-like Sn whiskers generated at 303 K during the electrodeposition showed an anomalous growth rate of 45 nm s⁻¹ at least.

Keywords: Sn whisker; Electrodeposition; Critical film thickness; Dominant crystallographic plane

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