

Effect of addition of polyethylene glycol into trivalent chromium bath on chromium coating

ABSTRACT

Conventionally, chromium is deposited from hexavalent chromium baths containing extremely toxic compounds of Cr (VI). Due to serious health and environmental concerns of Cr (VI), trivalent chromium bath is proposed as a counter approach towards greener and safer chromium plating. In the present work, chromium coatings were electrodeposited onto copper substrate using a modified trivalent chromium electroplating bath with addition of polyethylene glycol (PEG 1500). The effects of PEG on the Cr coating were investigated. The crystalline structure, composition and surface morphology of the deposits were studied by X-ray diffraction (XRD), energy-dispersive X-ray spectroscopy (EDX) and scanning electron microscopy (SEM). The surface roughness of the coatings were characterized by atomic force microscopy (AFM). With addition of PEG, the surface roughness of Cr coating decreased by 44.5 % and the corrosion rate decreased by 23.3 % compared to that of without PEG. Meanwhile, the hardness increased by 22.7 %.

Keyword: Chromium; Coating; Corrosion resistance; Electrodeposition; Hardness; Polyethylene glycol; Roughness; Trivalent chromium bath