

ABSTRAK

Elektropeyaduran timah daripada *tin(II) methane sulfonate (MSA)* dengan cecair ionik yang stabil di udara dan air, *1-butyl-1-methyl-pyrrolidinium trifluoro-methanesulfonate, (BMPOTF)* telah dikaji pada suhu bilik dengan kepekatan yang berlainan. Kitaran voltammetri telah digunakan untuk mengkaji sifat elektrokimia timah semasa proses penurunan dan pengoksidaan. Pemalar difusi ion timah pada campuran cecair ionik *BMPOTF* dan elektrolit berasaskan *MSA* dikira melalui persamaan Randles-Sevcik dan persamaan Cottrell adalah $2 \times 10^{-7} \text{ cm}^2/\text{s}$. Elektropeyaduran timah ke atas kepingan kuprum telah dikaji dengan ketumpatan arus yang berlainan supaya kesan arus di campuran *BMPOTF* dan elektrolit berasaskan *MSA* dapat diketahui. Campuran *BMPOTF* dan elektrolit berasaskan *MSA* telah membawa kesan arus setinggi 99.9%. Tata bentuk bagi peyaduran timah ke atas kepingan kuprum yang disadur menerusi campuran *BMPOTF* dan elektrolit berasaskan *MSA* telah dikaji melalui cara EDX, SEM dan AFM. Struktur peyaduran yang padat, halus dan berbutir poligon dapat diperoleh. Sampel peyaduran yang disaduri menerusi campuran *BMPOTF* dan elektrolit berasaskan *MSA* telah menunjukkan kecekapan pematerian yang cemerlang di mana setanding dengan sampel peyaduran yang disadur di elektrolit berasaskan *MSA*.

ABSTRACT

The electrodeposition of tin from Tin(II) Methane Sulfonate (MSA) with varying concentration in air and water stable 1-butyl-1-methyl-pyrrolidinium trifluoromethanesulfonate, (BMPOTF) ionic liquid at room temperature was studied. Cyclic Voltammetry served to characterize the electrochemical behavior of tin reduction and oxidation. The diffusion coefficient of stannous ions in the mixture of BMPOTF ionic liquid and MSA based electrolyte obtained via Randles-Sevcik and Cottrell equation was $2 \times 10^{-7} \text{ cm}^2/\text{s}$. Electroplating on copper panel was conducted under different current densities to determine BMPOTF based tin plating solution current efficiency. Mixture of BMPOTF and MSA based tin plating solution gave current efficiency as high as 99.9%. The deposit morphology of the mixture BMPOTF and MSA based tin coated substrates was observed by using EDX, SEM and AFM. A dense, fine and polygonal grain structure was obtained. BMPOTF based tin plated substrates have shown excellent solderability which was comparable to MSA based coated material in wetting balance test.