Electrodeposition of Lead from 1-Methylimidazolium Trifluoromethylsulfonate Ionic Liquid

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In this work, it found that lead oxide (PbO) can be dissolved well in 1-methylimidazolium trifluoromethylsulfonate (MIMTfO) ionic liquid. The electrodeposition of lead from PbO in MIMTfO ionic liquid was studied. Cyclic voltammetry studies showed that the reduction of Pb(II) is a irreversible and one-step reaction process. Chronoamperometry results presented that the nucleation mechanism of lead is fit instantaneous nucleation under diffusion control. The diffusion coefficient of Pb(II) at 373 K is approximately $3.6 \times 10^{-8} \text{ cm}^2 \text{ s}^{-1}$. The electrodeposition experiments were conducted at 383 K and 393 K using potentiostatic electrolysis. A compact electrodeposit was obtained at 383 K in MIMTfO ionic liquid, which was confirmed to be metallic lead.

Keywords: lead; electrodeposition; ionic liquid; cyclic voltammetry; chronoamperometry

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