Electrodeposition of Magnetic Films of Co-Zn in $ZnCl_2$-$DMSO_2$-$CoCl_2$ Molten Salt Electrolytes

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The electrodeposition of magnetic films of Co-Zn in zinc chloride-dimethylsulfone ($ZnCl_2$-$DMSO_2$) molten salt electrolytes with added $CoCl_2$ has been studied. The phase diagram of $ZnCl_2$-$DMSO_2$ molten salts was determined by differential scanning calorimetry (DSC) and thermogravimetric analysis (TGA). Various compositions of alloys with different deposition potentials on the electrode surface have been studied by cyclic voltammetry. Either the constant potential method or the pulse potential method of plating can be used for electrodepositing Co-Zn thin films. The surface morphologies and magnetic properties have been studied. It has been shown that compact needle-type Co-Zn thin films are obtained at a constant potential of -0.1 V. Compact and uniform Co-Zn thin films are obtained by pulse electrodeposition. The magnetic properties of these films show higher coercive forces (H_c) and smoother domains than those obtained by the constant potential method.

Key words: Pulse Potential Method; Surface Morphology; Coercive Force.