

Influence of Sulphur Impurities on the Interfacial Tension between Aluminium and Cryolite Alumina Melts

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Z. Naturforsch. **62a**, 309 – 314 (2007); received February 9, 2007

Presented at the EUCHEM Conference on Molten Salts and Ionic Liquids, Hammamet, Tunisia, September 16 – 22, 2006.

The interfacial tension (IFT) between aluminium and cryolite melts containing different salt additions (AlF_3 , NaF , Na_2SO_4) has been measured during electrolysis by the capillary depression method. The technique is based on the measurement of the capillary depression occurring when a capillary, which is moved vertically down through the molten salt layer, passes through the metal/salt interface. The depression is measured by simultaneous video recording of the immersion height of the alumina capillary. The interfacial tension is strongly dependent on the $n(\text{NaF})/n(\text{AlF}_3)$ ratio. The addition of Na_2SO_4 decreases the IFT of the aluminium/electrolyte interface. We also found the different influence of the conditions of electrolysis on the IFT in systems with and without Na_2SO_4 . In systems without Na_2SO_4 the IFT decreases with increasing current density, and in systems with Na_2SO_4 it increases.

Key words: Interfacial Tension; Cryolite; Sulphur Impurities; Aluminium Electrolysis.