

## **Electrochemical Behaviour of Dissolved Iron Species in Molten Salts**

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Electrochemical techniques, mainly linear sweep voltammetry and potential step chronoamperometry, were used to study the behaviour of dissolved iron species in molten salts based on calcium chloride. The studies are linked to possibilities for electrodepositing iron from a molten salt containing dissolving  $\text{Fe}_2\text{O}_3$  at moderate temperatures ( $\sim 800$  °C). Varying amounts of NaCl, CaO and  $\text{AlF}_3$  were added to pure molten  $\text{CaCl}_2$ . It was found that the presence of an acidic substance such as  $\text{AlF}_3$  was necessary for obtaining a well-defined voltammetric current versus potential response due to the electrodeposition of iron on a tungsten cathode. In the molten mixture  $\text{CaCl}_2$  (76 mol%) - NaCl (19 mol%) -  $\text{AlF}_3$  (5 mol%) at 800 °C it was found that the solubility of  $\text{Fe}_2\text{O}_3$  was of the order of 2 mol%, based on results from voltammetry. The cathode process was found to be diffusion controlled and to take place in one reduction step. Initial attempts to deposit iron during electrolysis resulted in a powderish product with poor adherence to the tungsten cathode.