Electrochemical Preparation of Molybdenum Coatings on Nickel from KF-MoO₃ Melts

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In this paper, a molybdenum coating was first prepared in a molten KF-MoO₃ system by electrolysis, and the electrochemical behaviour of molybdenum ions in this system was studied at 900 °C. In the electrochemical test, a platinum wire was used as the working electrode, a molybdenum wire was used as the quasi-reference electrode and a graphite crucible was used as the auxiliary electrode. Results showed that the reduction process of molybdenum ions on a platinum electrode was a one-step process with an exchange of six electrons. The cathode process was a quasi-reversible process controlled by diffusion, and the diffusion coefficient was calculated to be $0.905 \times 10^{-5} \text{ cm}^2 \cdot \text{s}^{-1}$. Subsequently, galvanostatic electrolysis was carried out in the KF-MoO₃ (95:5 mol%) system, and a smooth and compact molybdenum coating was obtained. The influence of different electrolysis conditions on the quality of the molybdenum coating was also investigated. It is concluded that the coating quality was the best when the temperature was 900 °C, the current density was 11-33 mA·cm⁻², the electrolytic time was 30-60 minutes, and the base material was nickel.

Keywords: molybdenum coating; electrodeposition; molten salt; fluoride

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