

An experimental study on titanium deposition in molten salt system using electrochemical approach

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The electrochemical behavior of Ti^{2+} was experimentally investigated in molten NaCl-KCl- $TiCl_2$ system using cyclic voltammetry technique. The measurements were carried out at 973K in high purity argon atmosphere, using molybdenum wire as working electrode, Ag/AgCl as reference electrode as well as high purity graphite as the counter one. The results showed that the recharge of bivalence titanium at cathode was an ion diffusion controlled process with two-electron recharging ($n=2.1$) single step. The diffusion coefficient of Ti^{2+} attained was as high as $1.2 \times 10^{-5} \text{ cm}^2 \cdot \text{s}^{-1}$. The results of electrolyze experiments with constant current density mode showed that the size of deposited titanium grain increased with the concentration of Ti^{2+} in the molten salt. The results also indicate that a suitable range of initial electrical current density can be found to attain higher crystal growth rate with relatively large grain size. A schematic diagram for crystal morphology variation of bivalence titanium concentration and initial electrical current density is provided with the basis of the above experimental results.

Keywords: Titanium; Deposition; Molten salt, Morphology, Electrolyze

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200 English words in total.**

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