Short Communication

Electrodeposition of Aluminum from AlCl_3 -1-Ethyl-3-Methylimidazolium Fluoride

Dexi Wang^{1,2}, Xiongwei Zhong^{1,3}, Fengguo Liu^{1,4}, Zhongning Shi^{1,4*}

¹ Key Laboratory for Ecological Utilization of Multimetallic Mineral (Ministry of Education), Northeastern University, Shenyang 110819, China

² School of Chemical Engineering Equipment, Shenyang University of Technology, Liaoyang 111003, China

³ Department of Materials Science and Engineering, Southern University of Science and Technology, Shenzhen, 518055, China

⁴ School of Metallurgy, Northeastern University, Shenyang 110819, China.

*E-mail: shizn@smm.neu.edu.cn

doi: 10.20964/2019.10.06

Received: 29 April 2018 / Accepted: 11 July 2019 / Published: 30 August 2018

The electrodeposition of aluminum was successfully achieved in AlCl_3 -1-ethyl-3-methylimidazolium fluoride (EmimF) at a potential of -0.3V (vs. Al/Al^{3+}) and a temperature of $90\text{ }^\circ\text{C}$. Cyclic voltammetry, chronopotentiometry and chronoamperometry were used to investigate the electrochemical behavior of Al_2Cl_7^- . Cyclic voltammetry and chronopotentiometry measurements indicate that the reduction of Al_2Cl_7^- to metallic Al in AlCl_3 -EmimF (molar ratio 2.7) is a one-step three-electron transfer and irreversible diffusion-controlled process. The chronoamperometry results show that the deposition of aluminum on a Pt electrode involves instantaneous three-dimension nucleation. In addition, X-ray diffraction (XRD) analysis confirmed that the deposit is pure aluminum, while scanning electron microscope (SEM) images reveal that dense and compact deposits were obtained at a more negative potential.

Keywords: deposition, metals, liquids, electrochemistry, X-ray diffraction

[FULL TEXT](#)

© 2019 The Authors. Published by ESG (www.electrochemsci.org). This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>).