Characteristic and Control of Electrochemical Oscillation at the Anode during Electrolytic Refining Copper

Lifeng Ding^{=,1,3,*}, Qiang Li^{=,2,*}, Jinxia Yuan³, Xiaoyun Dong¹, Di Peng⁴, Baoyi Li¹, Hongdao Li¹, Yanfeng Xue¹, Yulan Niu¹

¹ Department of Chemistry and Chemical Engineering, Taiyuan Institute of Technology, Taiyuan 030008, PR China

² MicroNano System Research Center, College of Information and Computer & Key Laboratory of Advanced Transducers and Intelligent Control System of Ministry of Education and Shanxi Province, Taiyuan University of Technology, Taiyuan, 030024, PR China

³ School of Chemical Engineering and Technology, North University of China, Taiyuan 030051, PR China

⁴ Criminal Investigation College, Southwest University of Political Science and Law, Chongqing 401120, PR China

⁼These authors contributed equally to this work.

*E-mail: happydlf@163.com, liqiang02@tyut.edu.cn.

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Electrolytic refining copper production is a high-energy hydrometallurgical industry. The key to develop a new method for energy-saving electrolysis of high-purity cathode copper is to reduce the electrical-energy consumption of electrochemical oscillations (EOs) at the anode. This phenomenon cannot be explained based on traditional equilibrium thermodynamics theory. In this paper, a simplified electrolytic copper system was used with H₂SO₄–CuSO₄ solution to research the behaviour and characteristic of EOs at the anode, as well as to analyse the mechanism of EOs and the effect of potential on EOs. The electrochemical oscillation was regulated by improving the anode (such as copper anode and lead dioxide anode) and introducing additives (such as hydrochloric acid, thiourea and bone glue). The obvious inhibition effect of thiourea and lead dioxide anode on electrochemical oscillation was found, so as to improve the electrolysis process. It is possible to find a new energy-saving and environmental protection electrolysis working area in the equilibrium zone.

Keywords: Electrochemical oscillation, Electrolytic refining, Copper anode, Electrodissolution, Energy-saving

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