The Significant Effect of Supporting Electrolytes on the Galvanic Deposition of Metallic Rhenium

Huazhen Cao, Lilong Hu, Huibin Zhang, Guangya Hou, Yiping Tang, Guoqu Zheng*

College of Materials Science and Engineering, Zhejiang University of Technology, Hangzhou, 310014, China

*E-mail: zhengggq@zjut.edu.cn

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The effects of a supporting electrolyte (Na_2SO_4) on the galvanic deposition of metallic rhenium from acidic ammonium perrhenate aqueous solution were investigated. The results show that the supporting electrolyte plays an important role in the galvanic deposition of metallic rhenium. The main product in the more concentrated NH_4ReO_4 solution is only rhenium oxides in the absence of supporting electrolyte due to substantial hydrogen evolution reaction (HER). However, the introduction of a supporting electrolyte enhances the activation energy of the HER, resulting in the formation of metallic rhenium. The current efficiency is as high as 31.4% under optimized conditions, which is far above the values previously reported.

Keywords: metallic rhenium; electrodeposition; supporting electrolyte; sodium sulfate

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