Int. J. Electrochem. Sci., 11 **(2016)** 4149 - 4160

International Journal of ELECTROCHEMICAL SCIENCE
www.electrochemsci.org

Electrokinetic Dewatering of Mine Tailings Using DSA Electrodes

Joon Kyu Lee[1,*], *Julie Q. Shang*[2], *Yanqing Xu*[2]

[1] Dept. of Civil Engineering, University of Seoul, 163 Seoulsiripdae-ro, Dongdaemun-gu, Seoul 02504, Republic of Korea
[2] Dept. of Civil and Environmental Engineering, Western University, London, ON, N6A 5B9, Canada
[*]E-mail: jkleegeo@uos.ac.kr

doi: 10.20964/1009160

Received: 24 September 2015 / *Accepted:* 15 November 2015 / *Published:* 1 April 2016

Electrokinetic dewatering has been shown to be a promising technology; however, one of the challenges in its practical application is the corrosion of anodes. Recently, dimensionally stable anodes (DSAs) were developed that are virtually corrosion free. This paper investigates the feasibility of using titanium anodes with iridium oxide coating (IrO_2/Ta_2O_5) in the electrokinetic dewatering of mine tailings slurries. Characterization of the tailings is presented, followed by the results of electrokinetic dewatering, including the gradually increased and decreased voltages applied during the treatment, polarity reversal, and surcharge pressure applied to tailings. The results show that electrokinetic treatment using DSAs can significantly dewater tailings with low density and minimize electrode corrosion. The electroosmotic permeability measured for the combination of voltages and surcharge pressures ranges from 6.39×10^{-9} m^2/sV to 5.30×10^{-8} m^2/sV. The results also show that the effectiveness and efficiency of the electrokinetic dewatering of tailings can be improved by first applying a high voltage and then reducing it gradually during treatment.

Keywords: Electrokinetics, dewatering, mine tailings, electroosmotic permeability, DSA electrode

FULL TEXT