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Integrating Chloride Addition and Ultrasonic Processing with Electrocoagulation to Remove Passivation Layers and Enhance Phosphate Removal

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Abstract

In this study, the effects of integrating chloride addition and ultrasonication with electrocoagulation (EC) to remove passive layers were investigated. Experimental results were evaluated by conducting an impedance modulus analysis and by considering the amounts of aluminum released. The effect of different operating parameters, such as the phosphate concentration, ultrasonic power, chloride concentration, and the number of cycles on the efficiency of phosphate removal was examined. The results indicated that the integrated ultrasonic and chloride addition process effectively enhanced the energy efficiency and lifespan of plates due to the reduction of the electric impedance. The concentration of released aluminum increased from 150 to 440 mg/L with the increase of ultrasound from 0 to 100 W. After three test cycles, the use of the ultrasonic process and chloride addition with EC

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