Effective removal of total organic carbon from soil polluted with agricultural solid waste leachate using electrocoagulation

Xu Han^{1,2}, Guangchun Liu^{1,*}, Kun Liu², Ting Li²

¹ Liaoning Provincial Key Laboratory of Urban Pest Management and Ecological Safety, ShenYang University, ShenYang 110044, China

² Green Island Institute of Environmental Resources, ShenYang City University, Shenyang 110112, China

*E-mail: liuguangchun666@sina.com

doi: 10.20964/2021.06.07

Received: 2 February 2021 / Accepted: 22 March 2021 / Published: 30 April 2021

This study focused on treatment of total organic carbon (TOC) and chemical oxygen demand (COD) from soil pollution of agricultural solid waste leachate using electrocoagulation by Al and Fe nanocomposite (Al@Fe) electrodes. Al@Fe was synthesized through an electrodeposition method. Study of morphology and crystalline structure of the sample by SEM and XRD analyses showed that the electrodeposited samples consisted of spherical nanoparticles of Al in fcc crystal structure and Fe in polycrystalline α -iron metallic which homogeneously distributed in the composite matrix. Moreover, the effects of initial pH, current density and Fe concentration in nanocomposite content on electrocoagulation treatment were examined. Results showed COD and TOC removal efficiencies were obtained 95% and 96%, respectively after 60 minutes electrocoagulation treatment in 2 gL⁻¹ NaCl as a supporting electrolyte under optimal condition (pH 6) and applied current density of 1mA/cm² at room temperature using Al@Fe electrode with equal concentration of Al and Fe. Results indicated that synergetic effect of Al and Fe nanoparticles in nanocomposites electrodes provided the higher effective surface and fast electron transfer rate for electrochemical treatment.

Keywords: Electrocoagulation; Total organic carbon; Chemical oxygen demand; Agricultural solid waste leachate; Nanocomposite

[FULL TEXT](#)

© 2021 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/>).