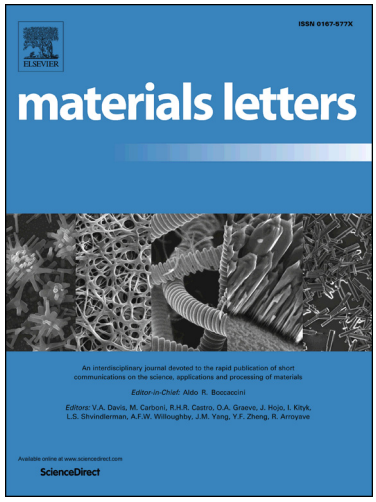

Enhanced sorption of Cu^{2+} from sulfate solutions onto modified electric arc furnace slag

Irena Nikolić, Smilja Marković, Ljiljana Veselinović, Vuk V. Radmilović, Ivona Janković-Častvan, Velimir R. Radmilović

PII: S0167-577X(18)31590-8
DOI: https://doi.org/10.1016/j.matlet.2018.10.027
Reference: MLBLUE 25068

To appear in: *Materials Letters*

Received Date: 3 April 2018
Revised Date: 4 September 2018
Accepted Date: 6 October 2018

Please cite this article as: I. Nikolić, S. Marković, L. Veselinović, V.V. Radmilović, I. Janković-Častvan, V.R. Radmilović, Enhanced sorption of Cu^{2+} from sulfate solutions onto modified electric arc furnace slag, *Materials Letters* (2018), doi: https://doi.org/10.1016/j.matlet.2018.10.027

Enhanced sorption of Cu^{2+} from sulfate solutions onto modified electric arc furnace slag

Irena Nikolić[1,2,*], Smilja Marković[3], Ljiljana Veselinović[3], Vuk V. Radmilović[4], Ivona Janković-Častvan[5], Velimir R. Radmilović[6]

[1]*University of Montenegro, Faculty of Metallurgy and Technology, Podgorica, Montenegro*

[2]*Institut of Public Health of Montenegro, Podgorica, Montenegro*

[3]*Institute of Technical Sciences of SASA, Belgrade, Serbia*

[4]*Innovation Centre, Faculty of Technology and Metallurgy, University of Belgrade, Belgrade, Serbia*

[5]*Faculty of Technology and Metallurgy, University of Belgrade, Belgrade, Serbia*

[5,6]*Serbian Academy of Sciences and Arts, Belgrade, Serbia*

Abstract

Pristine electric arc furnace slag (EAFS) as well as EAFS modified by alkali activation i.e. alkali activated slag (AAS) have found a novel application as adsorbents used in Cu^{2+} removal from sulfate solutions. The adsorption tests were carried in batch conditions and results have shown that alkali activation of EAFS enhances the Cu^{2+} adsorption. The adsorption process was found to follow a pseudo second-order kinetic model and occurs via formation of posnjakite ($Cu_4(SO_4)(OH)_6 \times H_2O$) on the surface of both, EAFS and AAS. Enhanced adsorption properties of AAS, compared to EAFS, are attributed to a more porous structure, larger specific surface area and an increased number of surface groups involved in the binding of Cu^{2+}.

Keywords: Steel slag, Adsorption, Copper, Alkali Activation, Porous materials, FTIR

1. Introduction

The electronics industry generates a large amount of copper bearing sulfate effluent due to the utilization of copper in the production of various electronic components and the use of sulfuric acid as an agent in electroplating, etching, rinsing, chemical and mechanical polishing [1]. This effluent presents a serious risk for the environment, when discharged into soil and inland water without necessary treatment.

*Corresponding author: e-mail: irena@ac.me; Tel/Fax: ++382 20 245 406