Preparation of Magnetic Iron/Graphitic Mesoporous Carbon Composites as Efficient Returnable Adsorbents for Methyl Orange Removal

Lifeng Cui¹,*, Mingcui Yao², Xia Bai², Lu Zhang², Shifei Kang²,*

¹ School of Chemistry and Environmental Engineering, Dongguan University of Technology, Guangdong 523808, P. R. China.
² Department of Environmental Science and Engineering, University of Shanghai for Science and Technology, Shanghai 200093, China
*E-mail: lifeng.cui@gmail.com, sfkang@usst.edu.cn

doi: 10.20964/2016.10.35

Received: 24 June 2016 / Accepted: 8 August 2016 / Published: 6 September 2016

The mesoporous silica SBA-15 was regarded as the template to synthesize a variety of magnetic iron/graphitic mesoporous carbon (Mag-GMC) composites, via a simple one-step solid-liquid grinding/templating route. The physicochemical properties of these composites were characterized by X-ray diffractometry, nitrogen sorption isotherms, transmission electron microscopy and vibrating-sample magnetometry. The methyl orange (MO) removal effects of these composites as adsorbents were investigated via a batch adsorption technique, and the effects of contact time and initial MO concentration on the adsorption capacity were also discussed. Also, the zeta potential of the as-prepared Mag-GMC composites was measured and compared. Mag-GMC-0.5 shows the highest MO adsorption ability of 90.6 mg/g, which is much higher than that of commercial active carbon. Recycle adsorption experiments indicate that the Mag-GMC composites are promising in returnable dye removal. The excellent adsorption performance can be ascribing to its unique mesoporous structure and decent zeta potential.

Keywords: Magnetic materials, Graphitic mesoporous carbon, Adsorption, Dye removal, zeta potential

© 2016 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/).