A Facile Fabrication of Fe₃O₄/polypyrrole/functionalized Carbon Nanotubes Composites for Photocatalytic Degradation of Contaminants from Wastewater

Bangjun Han*, Ruifeng Wang, Xingya Wei, Renzheng Gu

School of Civil and Transportation Engineering, Shanghai Urban Construction Vocational College,
200438 Shanghai, P. R. China

*E-mail: hanbangjun@succ.edu.cn

doi: 10.20964/2021.07.43

Received: 3 March 2021/ Accepted: 19 April 2021 / Published: 31 May 2021

This work was conducted on fabrication of Fe₃O₄/polypyrrole/functionalized carbon nanotubes (Fe₃O₄/PPy@f-MWCNTs) composite as photocatalyst for degradation of Bisphenol A from industrial wastewater. The composite was synthesized via a situ polymerization process. The structural analyses of Fe₃O₄/PPy@f-MWCNTs using SEM and XRD showed that polypyrrole particles and Fe₃O₄ spheres in cubic spinel crystal structure were uniformly decorated on the CNTs network. The optical study showed that the lower band gap of Fe₃O₄/PPy@f-MWCNTs toward PPy@f-MWCNTs can be related to the presence of more photoactivated site in sunlight region and cost-effective photocatalytic performance of Fe₃O₄/PPy@f-MWCNTs. Moreover, the electrochemical studies illustrated the higher effective surface area of Fe₃O₄/PPy@f-MWCNTs that indicated the higher photocatalytic active sites and consequently higher photocatalytic performance of composite. The photocatalytic studies of Fe₃O₄/PPy@f-MWCNTs revealed that the degradation rate under simulated sunlight was enhanced than that under UV light illumination. Moreover, the complete degradation of BPA was obtained after 15, 25, 35, 47 and 65 minutes simulated sunlight irradiation for 10, 20, 50 and 100 mM of initial concentration of BPA, respectively. These results show that the prepared photocatalyst can be reliable for the degradation of BPA in wastewater samples.

Keywords: Fe₃O₄ nanoparticles; Polypyrrole; Functionalized carbon nanotubes; Photocatalyst; Bisphenol A; Simulated sunlight

[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/>).