Electrochemical Photocatalytic Degradation of Eriochrome Black T Dye Using Synthesized TiO₂@CNTs Nanofibers

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In this study, TiO₂ and TiO₂@CNTs nanofibers were synthesized via electrospinning method and their morphological, structural, optical, electrochemical properties were considered. Furthermore, these electrodes were characterized as photocatalysts for degradation of Eriochrome Black T (EBT). The network rod structure of the porous electrospun TiO₂ and TiO₂@CNTs nanofibers were observed. The high porous and large interfacial area of nanofiber of TiO₂@CNTs contained the uniform distribution and direct growth of TiO₂ on the entangled bundles carboxylate MWCNT fibers surface. Optical study showed that the optical band gap values 3.19 eV and 2.42 eV were obtained for TiO₂ and TiO₂@CNTs nanofibers, respectively which indicate preparing the hybrid system of homogeneous mixture of MWCNTs with TiO₂ narrow the band gap and develops the visible light absorption. EIS result shows that the resistance for transfer of photo-generated electrons TiO₂@CNTs nanofibers samples were lower than TiO₂. The high degradation efficiency of EBT on TiO₂@CNTs nanofibers surface was obtained under visible irradiation because of the presence of MWCNTs which lead to narrow the band gap of hybrid system and promote the effective surface area and enhance the adsorption capacity of EBT on TiO₂@CNTs nanofibers photo-catalyst surface. Moreover, recombination of photo-generated electron-hole pairs can be decreased in TiO₂@CNTs.

Keywords: Photocatalyst; Degradation efficiency; Eriochrome Black T; TiO₂@CNTs nanofibers; Photo-generated electron

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