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## Natural nanomaterial engineering for water treatment: A new process to improve solar disinfection

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Low-cost treatment methods to allow safe use of water can have important beneficial implications in the rural area. Recently, pathogenic bacteria and macromolecular organic pollutants have become a focus problem in the water remediation. As an effective advanced treatment technology, Heterogeneous photocatalysis is a promising and innovative green purification technology. Photocatalysis technology based on iron oxide has provided an effective and promising means for remediation of environmental pollutants in air and water. Iron oxides and iron oxyhydroxides have been studied extensively as photocatalysts, because of their visible-light responsiveness, low cost, nontoxic nature, and natural abundance. Of the various such compounds investigated, natural goethite ( $\alpha$ -FeOOH) is known to be a visible-light-responsive photocatalyst.

In this study, the photocatalytic degradation of dye (Methylene Blue) and bacteria inactivation using polyacrylonitrile (PAN) nanofibers containing natural goethite particles were investigated. The fabricated composites nanofibers of

PAN/Goethite were characterized with Scanning Electron Microscopy (SEM) and Energy Dispersive X-ray (EDX). Chemical composition of the natural goethite nanoparticles were determined by X-ray Fluorescence spectrometry (XRF). Partially intercalated structures of PAN/Goethite composites nanofibers (CNF) were confirmed by SEM and EDX analysis. So, the aim of this study is the fabrication and surface engineering of electrospun PAN / goethite CNF, and the photocatalytic activities examination of this nanocomposite on the decomposition of dye and bacterial removal under visible-light irradiation.

The results show that the nanocomposites have highly enhanced photodegradation by their exfoliation using electrospinning technique, which decompose a high degradation efficiency (>90%) of dye in less than 5 hours. Then, 4,4 and 3,5 log units reduction of E. Coli and Clostridia respectively in less than 5 hours also.

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