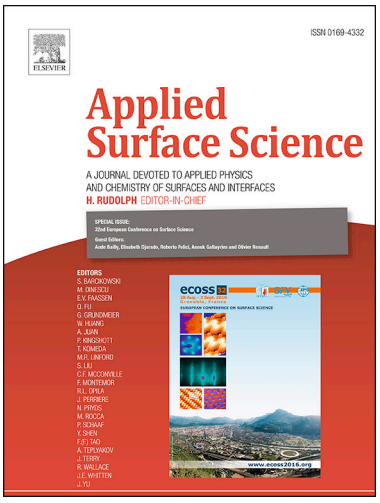

Full Length Article

Quick and enhanced degradation of bisphenol A by activation of potassium peroxymonosulfate to $SO_4^{\bullet-}$ with Mn-doped $BiFeO_3$ nanoparticles as a heterogeneous Fenton-like catalyst

Tayyebeh Soltani, Ahmad Tayyebi, Byeong-Kyu Lee

PII: S0169-4332(18)30407-0
DOI: https://doi.org/10.1016/j.apsusc.2018.02.063
Reference: APSUSC 38521

To appear in: *Applied Surface Science*

Received Date: 8 August 2017
Revised Date: 25 January 2018
Accepted Date: 5 February 2018

Please cite this article as: T. Soltani, A. Tayyebi, B-K. Lee, Quick and enhanced degradation of bisphenol A by activation of potassium peroxymonosulfate to $SO_4^{\bullet-}$ with Mn-doped $BiFeO_3$ nanoparticles as a heterogeneous Fenton-like catalyst, *Applied Surface Science* (2018), doi: https://doi.org/10.1016/j.apsusc.2018.02.063

Quick and enhanced degradation of bisphenol A by activation of potassium peroxymonosulfate to $SO_4^{\bullet-}$ with Mn-doped $BiFeO_3$ nanoparticles as a heterogeneous Fenton-like catalyst

Tayyebeh Soltani, Ahmad Tayyebi, Byeong-Kyu Lee*

Department of Civil and Environmental Engineering, University of Ulsan, Nam-gu, Daehak-ro 93, Ulsan 44610, Republic of Korea

Abstract

Mn-doped $BiFeO_3$ magnetic nanoparticles (BFO MNPs), namely $BiFe_{1-x}Mn_xO_3$ (x= 0.05 and 0.10), were successfully synthesized using a simple and novel sol-gel method and then applied as a highly efficient peroxymonosulfate ($KHSO_5$, PMS) activation catalyst for the fast degradation of bisphenol A (BPA) from aqueous solution. The strong PMS activation ability of 10 % Mn-doped BFO MNPs without any metal leaching due to the simultaneous effects of iron and manganese ions in the production of radical sulfate ($SO_4^{\bullet-}$), caused complete BPA degradation in 15 min, which was much faster than that using combinations with H_2O_2. TOC was reduced to 33 %, 23 % and 13 % by PMS activated with BFO, 5 and 10 % Mn doped BFO, respectively, which are 2.1, 2.6 and 3.15-fold lower than that same nanoparticles activated with H_2O_2. The photocatalytic mechanism of BPA with the simultaneous effects of iron and manganese ions in Mn-doped BFO was explored. The addition of $KBrO_3$ and $NaNO_3$ salts into Mn-doped BFO/PMS system reduced the complete BPA degradation time to 10 min, whereas

Corresponding author: Byeong-Kyu Lee , Tel: 82-52-259-2864, Fax: 82-52-259-2629*
E-mail address: bklee@ulsan.ac.kr