Electronic Supplementary Information (ESI)

"Tailored sunlight driven nano-photocatalyst: Bismuth Iron Tungstate ($BiFeWO_6$)"

R. Radha,[a] A. Srinivasan,[a] P. Manimuthu[b] and S. Balakumar[a,]*
[a]* National Centre for Nanoscience and Nanotechnology,
University of Madras, Maraimalai Campus, Chennai 600 025, India.
Fax: 044-22352494/ 22353309; Te: 044-22202749,
*E-mail: balasuga@yahoo.com
[b]Department of Nuclear Physics,
University of Madras, Maraimalai Campus, Chennai 600 025, India.

1. Structural analysis of Bi_2WO_6 NPs

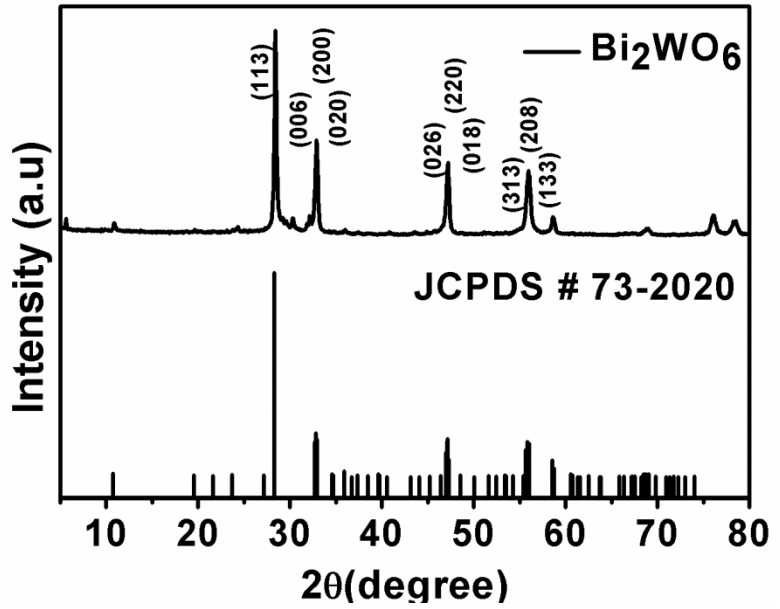

Fig. S1. Powder X-ray diffraction pattern of Bi_2WO_6

Bi_2WO_6 prepared by same procedure as that of $BiFeWO_6$ is used as reference to study the optical property. XRD result depicts that the prepared sample is highly crystalline and in good agreement with the standard diffraction pattern (JCPDS #73-2020). The XRD peaks are well indexed to the orthorhombic structure.

2. Total Organic Carbon (TOC) analysis during the course of methylene blue photodegradation using BFWO NPs

To investigate the photocatalytic activity of BFWO NPs, TOC experiment was performed. The result shows that the mineralization yield of BFWO NPs reaches a value of 73% after 4 h of irradiation. The rate of TOC reduction is slower than that of the degradation of dye, which shows 90% discoloration of MB in 4 h, Fig. 9 of the main article. It is well-known that the mineralization of the dye proceeds through two steps: ring cleavage and subsequently the oxidation of fragments. These results confirm that MB is first ring cleaved

and then converted to CO_2. The loss of TOC *via* mineralization can be lowered more than the removed amount of organic pollutants because these parent molecules are decomposed to smaller organic intermediates, and further degradation of these intermediates to CO_2 and H_2O may occur slowly[1,2].

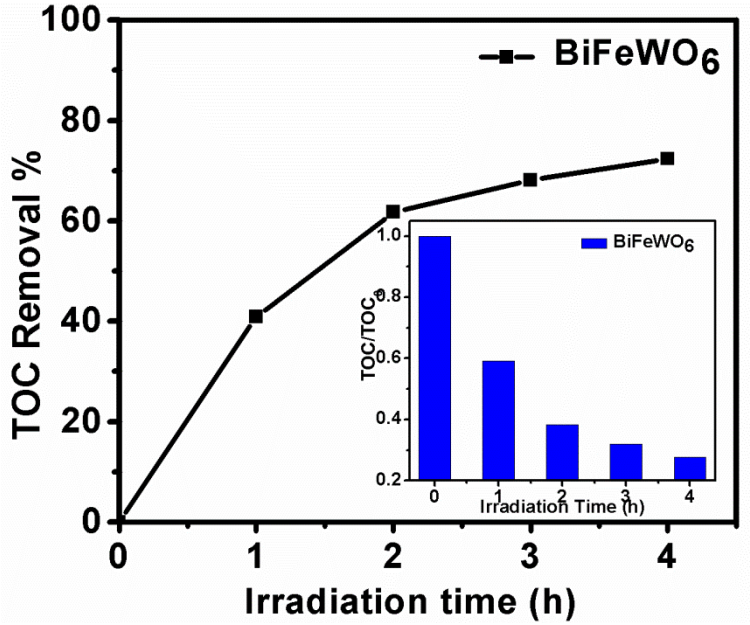

Fig. S2. TOC analysis during the course of methylene blue photodegradation using BFWO NPs

3. Photocatalytic degradation of Phenol using BFWO NPs

Phenol degradation was performed under laboratory condition in the visible region using 300W tungsten lamp.100 mg of $BiFeWO_6$ were dispersed in 100 ml of phenol solution isolated from 50 mg/L of stock. Photodegradation of colourless phenol, which has characteristic absorption peak at 270 nm was monitored by UV-Vis absorption spectra obtained by using Perkin Elmer Lambda 650s spectrophotometer. Within 3 h of time, 20 % of phenol was degraded. Further optimisation is required to yield better efficiency. The data has been shown in Fig. S3.

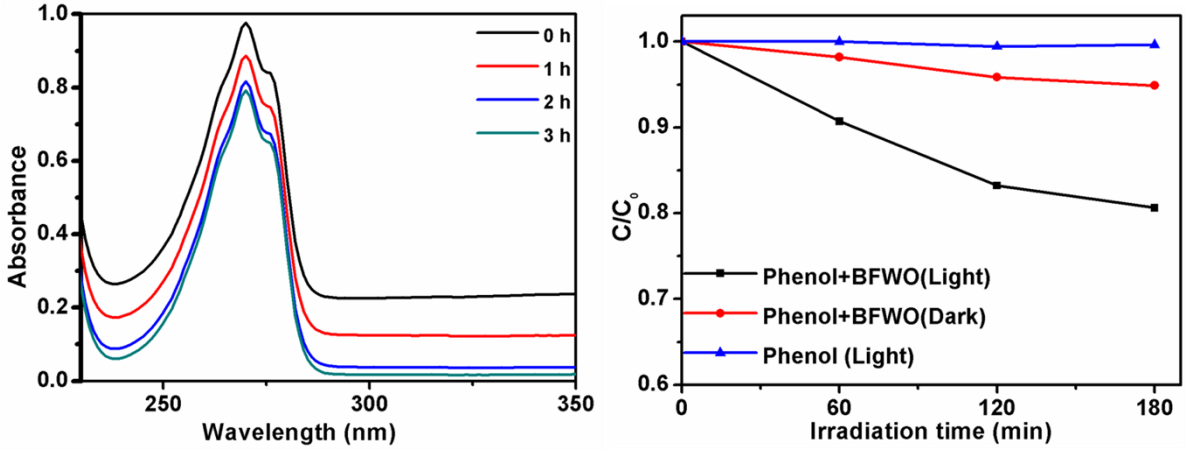

Fig. S3. Photocatalytic degradation of Phenol using BFWO NPs

4. Photocatalytic recycling ability of $BiFeWO_6$ nanoparticles

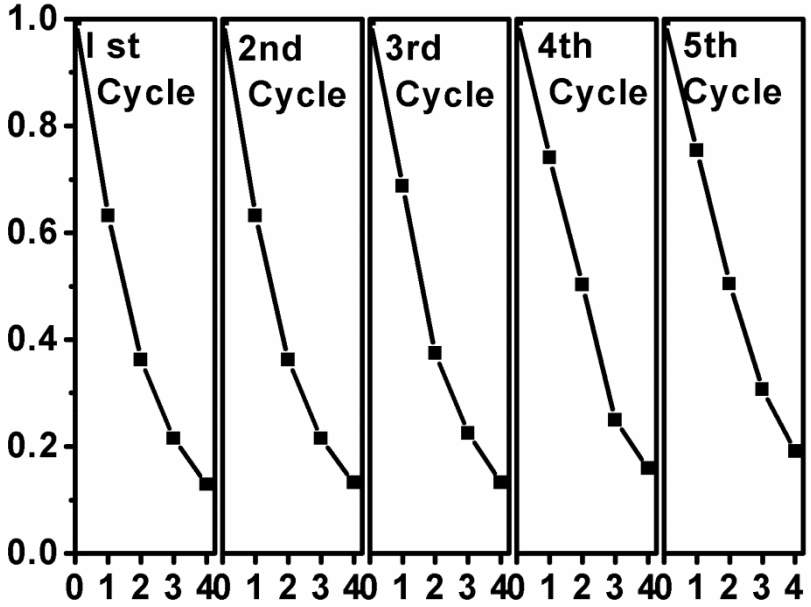

Fig. S4. Photocatalytic recycling ability of $BiFeWO_6$ NPs

The recycling ability of the BFW NPs is shown in the Fig. S4, from which the photocatalytic efficiency of the photocatalyst is found to be consistent in all five cycles.

References

1. Danjun Wang, Li Guo, Yanzhong Zhen, Linlin Yue , Ganglin Xue and Feng Fu, *J. Mater. Chem. A*, 2014, **2**, 11716.
2. L. S. Zhang, K. H. Wong, Z. G. Chen, J. C. Yu, J. C. Zhao, C. Hu, C. Y. Chan and P. K. Wong, *Appl. Catal., A*, 2009, **363**, 221