Electronic Supplementary Material (ESI) for Catalysis Science & Technology.

Spatial Separation of Dual-cocatalysts on Bismuth Vanadate for Selective Aerobic Oxidation of Benzylalcohols to Benzaldehydes Under Visible Light Irradiation

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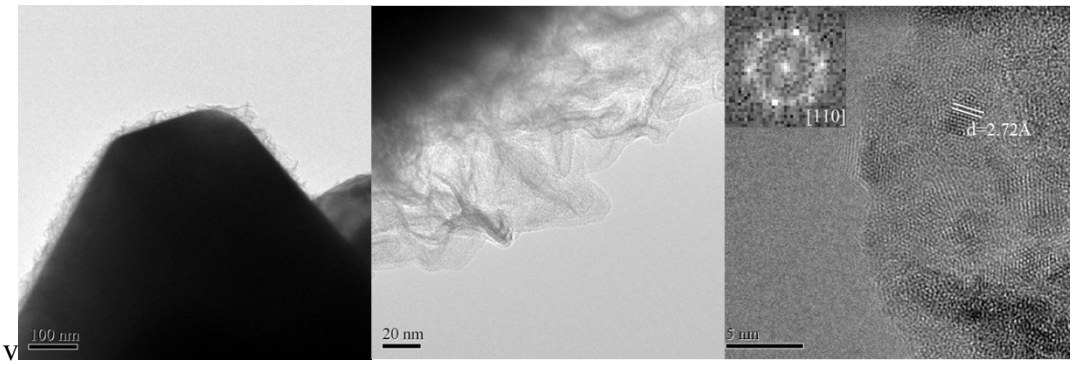

Figure S1. HRTEM images of $MnO_x/BiVO_4$ deposited after photo-deposition.

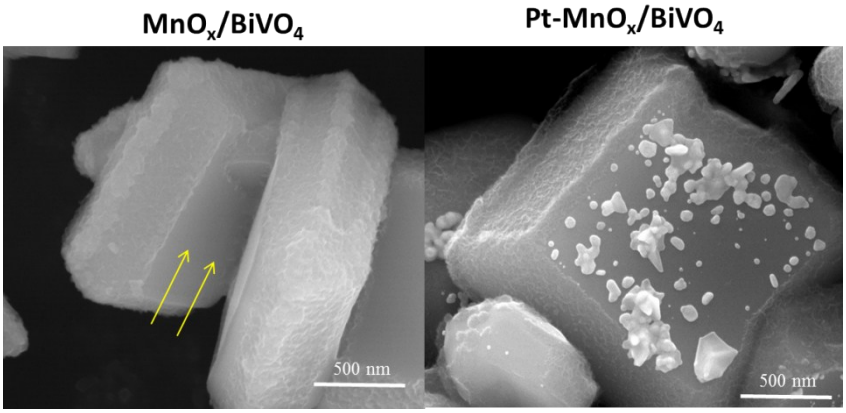

Figure S2. SEM images of $MnO_x/BiVO_4$ and Pt-$MnO_x/BiVO_4$.

Table S1. Comparison of photocatalytic concersion of benzyl alcohol to benzyl aldehyde with different photocatalysts.

Entry	Cat.	Condition	Con. (%)	Sel. (%)	Ref.
1	TiO_2	UV light, H_2O solvent	50	38	1
2	mpg-C_3N_4	trifluorotoluene solvent; O_2 (8 bar)	57	99	2
3	HNb_3O_8 nanosheet	trifluorotoluene solvent; O_2 (1 bar)	20	99	3
4	Bi_2WO_6	trifluorotoluene solvent; O_2 (0.1 MPa)	58	99	4
5	Bi_2MoO_6	trifluorotoluene solvent; O_2 (0.1 MPa)	29	99	5
6	$BiVO_4$	Toluene solvent O_2 (0.1 MPa)	63	99	This work

References.

1. S. Yurdakal, G. Palmisano, V. Loddo, V. Augugliaro, L. Palmisano, *J. Am. Chem. Soc.* 130 (2008) 1568-1569.
2. F. Z. Su, S.C. Mathew, G. Lipner, X.Z. Fu, M. Antonietti, S. Blechert, X.C. Wang, *J. Am. Chem. Soc.* 132 (2010) 16299-16301.
3. S. J. Liang, L. R. Wen, S. Lin, J. H. Bi, P.Y. Feng, X. Z. Fu, L. Wu, *Angew. Chem. Int. Ed.* 53 (2014) 2951-2955.
4. Y. H. Zhang, Y. J. Xu, *RSC Adv.* 4 (2014) 2904-2910.
5. B. Zhang, J. Li, Y. Gao, R. Chong, Z. Wang, L. Guo, X. Zhang,C. Li. *J. Catal.* 345 (2017) 96–103