**Fig. S1** FESEM image of as-prepared samples treated ultrasonically for a long period.

**Fig. S2** XRD patterns of products synthesized under different reactant adding sequences: (a) Sequence (i); (b) Sequence (ii).

**Fig. S3** XRD patterns of products synthesized at different pH values: (a) 5.5; (b) 7.5.
**Fig. S4** XRD patterns for products (a) room temperature reaction for 15min, (b) room temperature reaction for 6h; (c) room temperature reaction for 15min, then solvothermal treatment for 6h.

**Fig. S5** FESEM images of different samples: (a) Bi$_2$MoO$_6$; (b) BiVO$_4$. 