# Electronic Supplementary Imformation

## Nanoscale Kirkendall effect for the synthesis of $Bi_2MoO_6$ boxes via a facile solution-phase method

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**Experimental Section:**

0.144 g of $MoO_3$ nanorods, prepared as reported previously,[10] were suspended in 40 mL of ethylene glycol (EG) solution. Then 2 mmol of $Bi(NO_3)_3 \cdot 5H_2O$ was mixed together into the suspension at 140 ˚C. After stirring for 30 min, the white suspension changed into yellow gradually. The powder is washed with deionized water and ethanol to remove any ionic residual then dried in oven at 60 °C for 4 hours for further characterization.

For comparison, the bulk $Bi_2MoO_6$ powder (SSR) was prepared by traditional solid-state reaction according to the previous study.[8c]

The X-ray diffraction (XRD) patterns of the samples were measured on a D/MAX 2250V diffractometer (Rigaku, Japan) using monochromatized Cu Kα ($\lambda$ = 0.15418 nm) radiation under 40 kV and 100 mA and scanning over the range of $20° \leq 2\theta \leq 70°$. The morphologies and microstructures of as-prepared samples were analyzed by the Scanning Electron Microscope (SEM) (JEOL JSM-6700F) and Transmission Electron Microscopy (TEM) (JEOL JEM-2100F, accelerating voltage 200 kV). Nitrogen adsorption-desorption measurements were conducted at 77.35K on a Micromeritics Tristar 3000 analyzer after the samples were degassed at 200 °C for 6 h. The Brunauer-Emmett-Teller (BET) surface areas of the products were estimated using the adsorption data.

Photocatalytic activities of the samples were evaluated by the photocatalytic decolorization of Rhodamine-B (RhB) under visible light. A 500W Xe lamp was used as the light source with a 420 nm cutoff filter to provide visible-light irradiation. In

every experiment, 0.1 g of the photocatalyst was added into 100 mL RhB solution ($10^{-5}$ mol/L). Before illumination, the suspensions were magnetically stirred in the dark for 1 hour to ensure the establishment of an adsorption-desorption equilibrium between the photocatalyst and RhB. Then the solution was exposed to visible-light irradiation under magnetic stirring. At given time intervals, 3 mL suspension was sampled and centrifuged to remove the photocatalyst particles. Then, the UV-vis adsorption spectrum of the centrifugated solution was recorded using a Hitachi U-3010 UV-vis spectrophotometer.

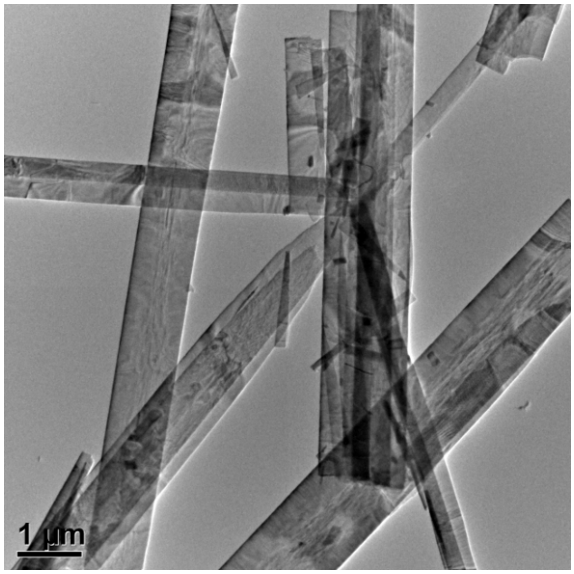


**Fig. S1** $MoO_3$ nanorods

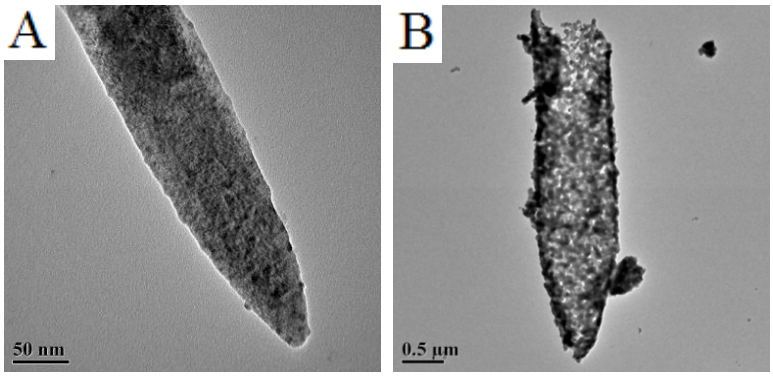


**Fig. S2** (A) The dissolution often starts from the end of the $MoO_3$ nanorods due to the high surface energy. (B) The obtained $Bi_2MoO_6$ nanotube prepared by the dissolved $MoO_3$ in situ template.

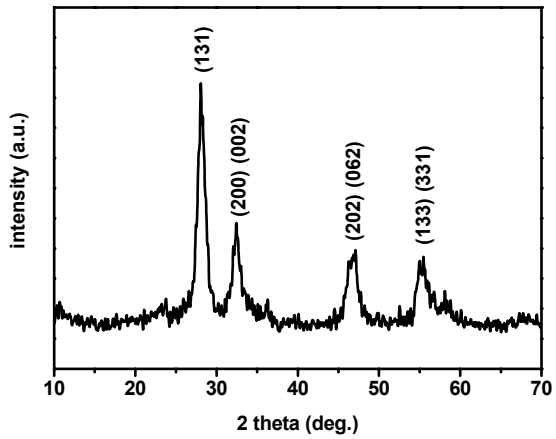


**Fig. S3** The XRD pattern of the orthorhombic $Bi_2MoO_6$.

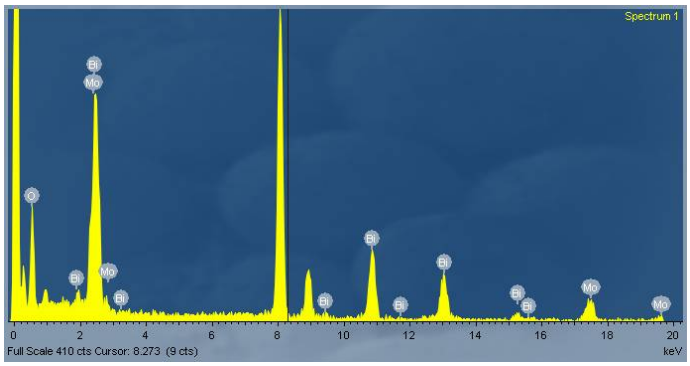


**Fig. S4** The EDX spectrum of the transformation stage of the $Bi_2MoO_6$ boxes.

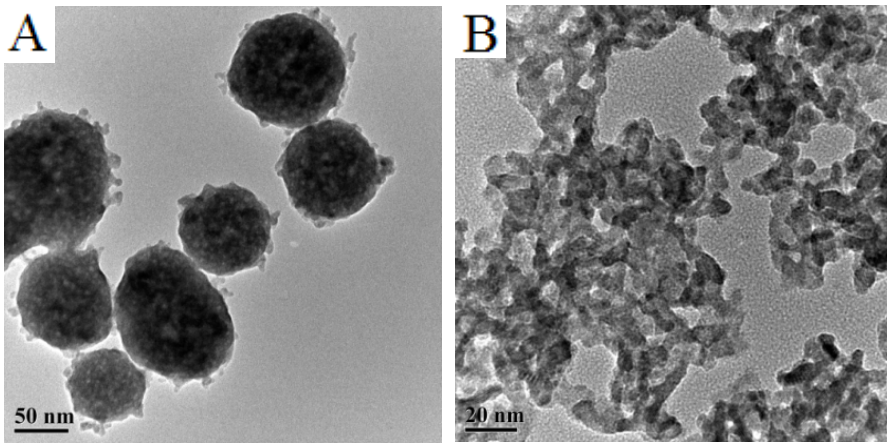


**Fig. S5** The TEM images of the $Bi_2MoO_6$ samples. (A) The porous nanospheres prepared at 155 ˚C; (B) the nanoparticles prepared at 170 ˚C.

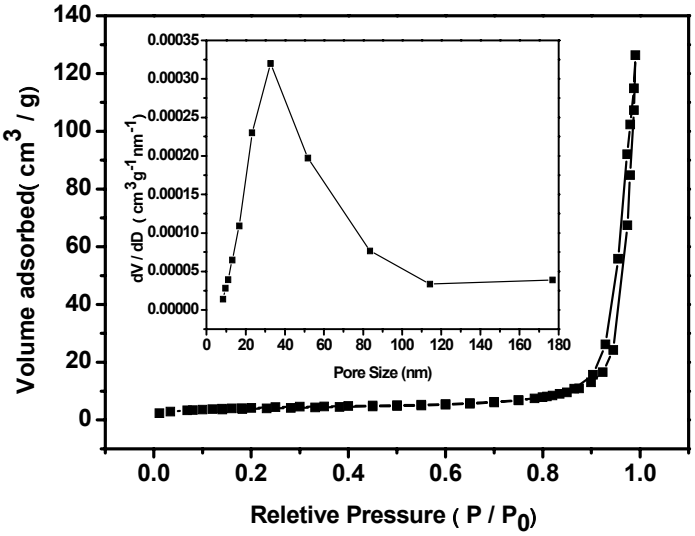


**Fig. S6** Nitrogen adsorption-desorption isothermal and the pore size distribution curve (inset) for the $Bi_2MoO_6$ boxes.