Supporting Information of

Facile One-step Synthesis of super-hydrophilicity $(NH_4)_{0.33}WO_3/WS_2$ Composites: A Highly Efficient Adsorbent for Methylene Blue

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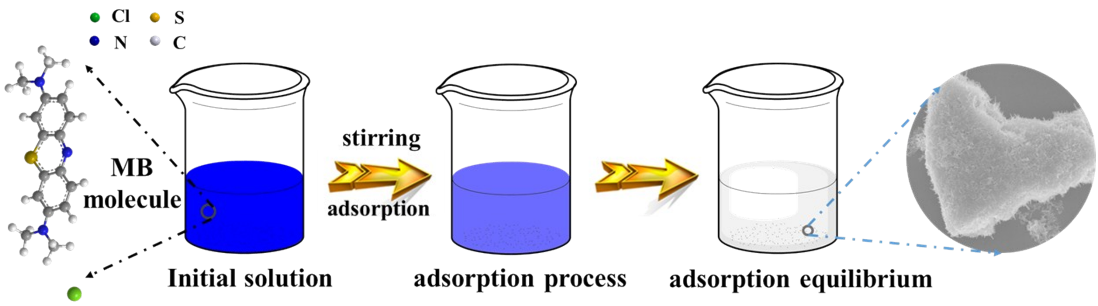

Fig. S1 Scheme for the adsorption of samples.

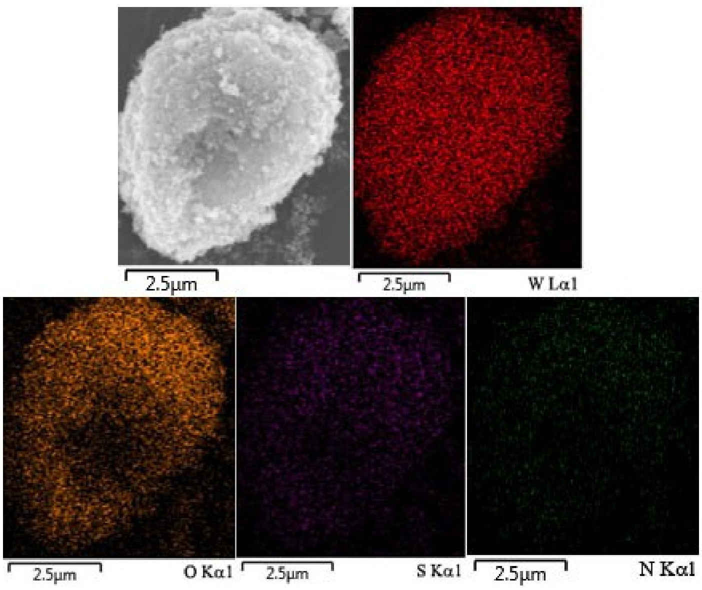

Fig. S2 EDS spectra of ATBDs-3.

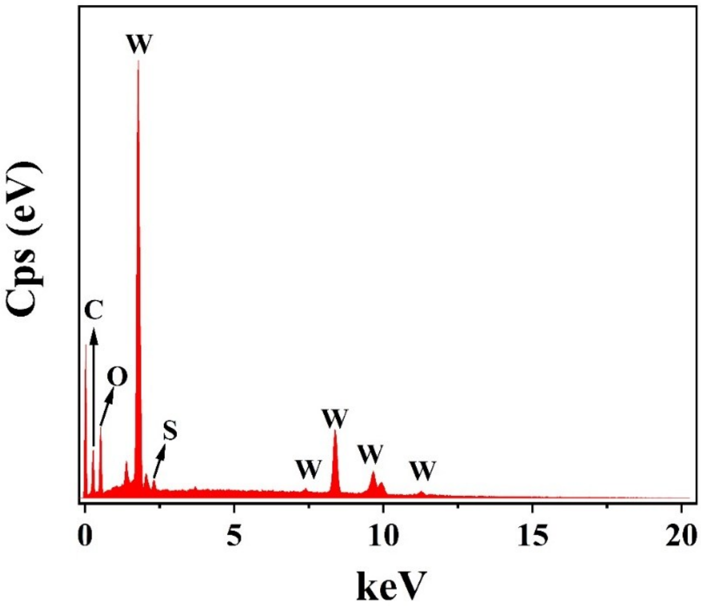

Fig. S3 EDS spot scan result of ATBDs-3.

Tab. S1 Chemical composition of W, O and S elements.

Element	Chemical composition	
	wt%	at%
W	80.35	25.697
O	18.71	72.498
S	0.93	1.805

EDS spot scan can briefly and quantitatively describe the composition of material elements[1, 2]. As showed in Fig. S3, the presence of C, W, O and S elements were detected. C element was from test substrate (conductive adhesive). Notably, N element, as a nonmetallic element, is difficult to be quantitatively characterized, so the content of N element is not shown here. The chemical composition of W, O and S elements was showed in Tab. S1. The composition molar ratio of S element is 1.8 %. The low recombination of S element was also one of the reasons why the WS_2 diffraction peak in the XRD was not obvious. The molar ratio of W/O is 2.82, which is basically consistent with the ratio of W/O in ammonium tungsten bronze.

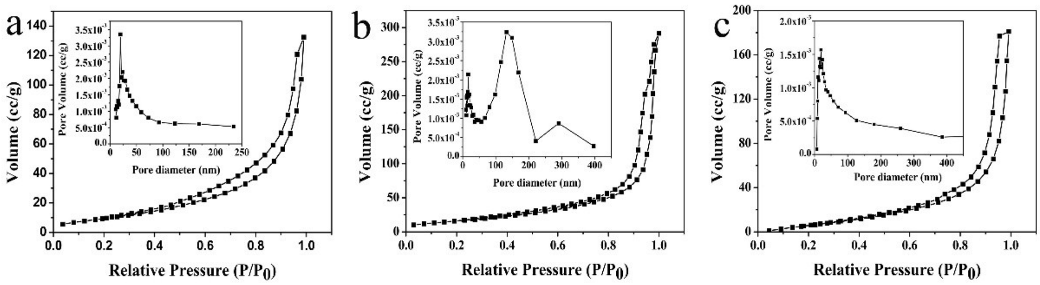

Fig. S4 Nitrogen adsorption-desorption isotherms and pore diameter distribution of (a) ATBDs-2, (b) ATBDs-3, (c) ATBDs-4.

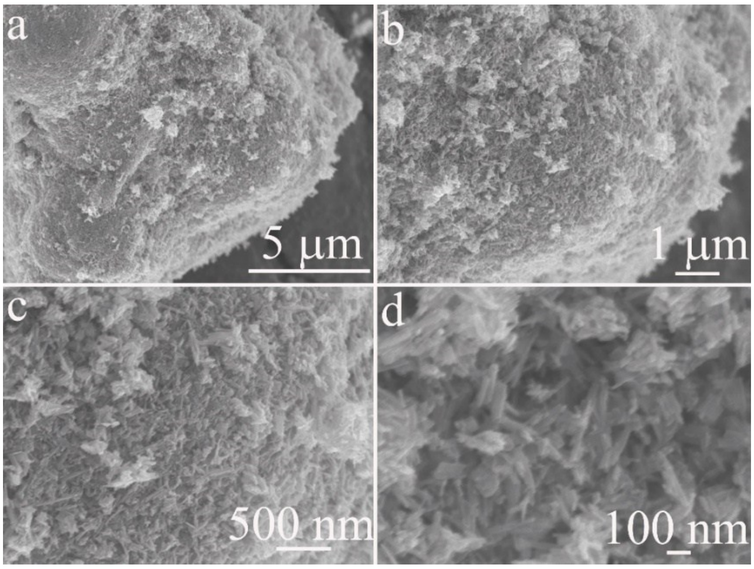

Fig. S5 FESEM images of ATBDs-3 at different magnification.

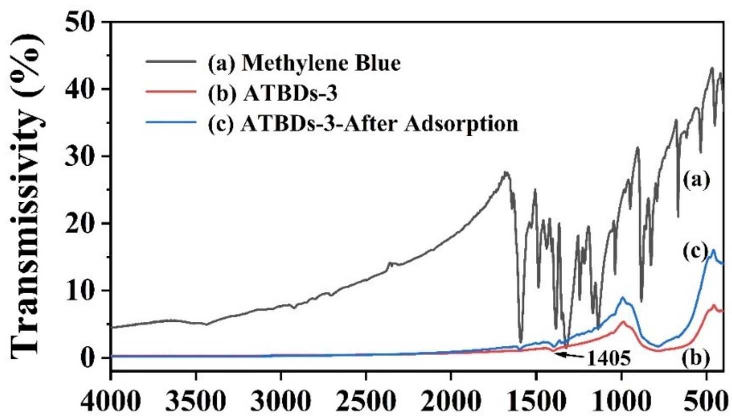

Fig. S6 FTIR spectra of (a) methylene bule, (b) ATBDs-3 and (c) ATBDs-3-After Adsorption.

In Fig. S6, the existence of sharp diffraction peaks of (a) at 830, 886, 1041, 1138, 1174, 1221, 1248, 1327, 1387, 1441, 1490 and 1597 cm^{-1} correspond to standard methylene blue spectrum[3]. The spectra of (b) ATBDs-3 and (c) ATBDs-3-After Adsorption were very similar, which indicated that after adsorption, the structure of ATBDs-3 did not change significantly, but also was affected by the adsorbed dye. Specifically, the broad peak in the 1000-500 cm^{-1} was attributed to W–O–W stretching mode[4]. And, it was worth noting that there was a characteristic relatively weak peak at 1405 cm^{-1} belonging to ammonium ion[4, 5], which auxiliary proved the successful synthesis of ammonium tungsten bronze. Simultaneously, in the range of 2000 to 4000 cm^{-1}, ATBDs-3 showed extremely low transmissivity (shielding effect) to infrared light[6].

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