Supporting Information

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**Fig. S1.** SEM image of the VO$_2$(D)-HCSMs (a) and their mapping images of V (b) and O (c).

**Fig. S2.** IR spectra of as-prepared VO$_2$(D)-HCSMs powder, MB, VO$_2$(D)-HCSMs loaded with MB and VO$_2$(D)-HCSMs after 4 cycles of MB adsorption and heat treatment at 250 °C for 4 h.
Fig. S3. XRD pattern of the C/VO$_x$ nanoparticles formed by calcination of the VO$_2$(D)-HCSMs after 4 cycles of adsorption.
Fig. S4 (a, b) SEM image of the C/VO$_x$ nanoparticles. (c, d, e) element mapping images for V, O, C.