

# **Synthesis and characterization of a series of novel provskite-type LaMnO<sub>3</sub> / Keggin-type polyoxometalate hybrid nanomaterials for fast and selective removal of cationic dyes from aqueous solution**

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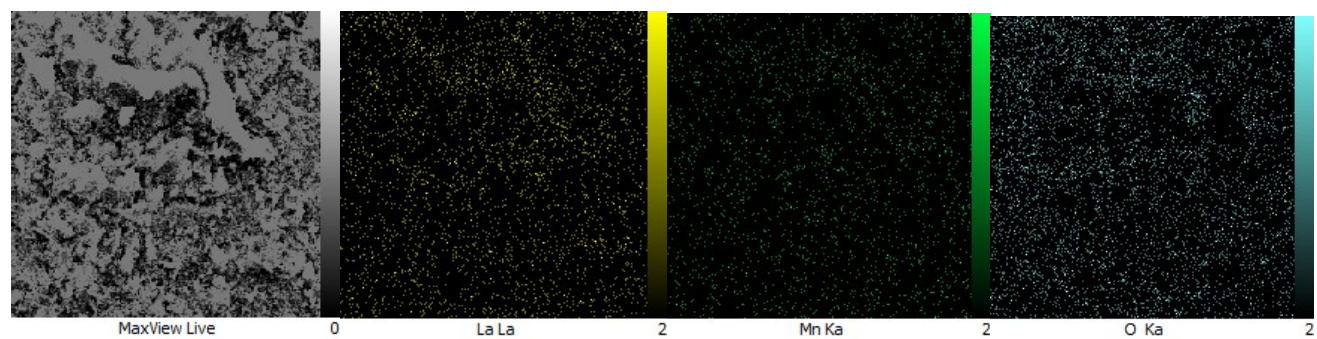
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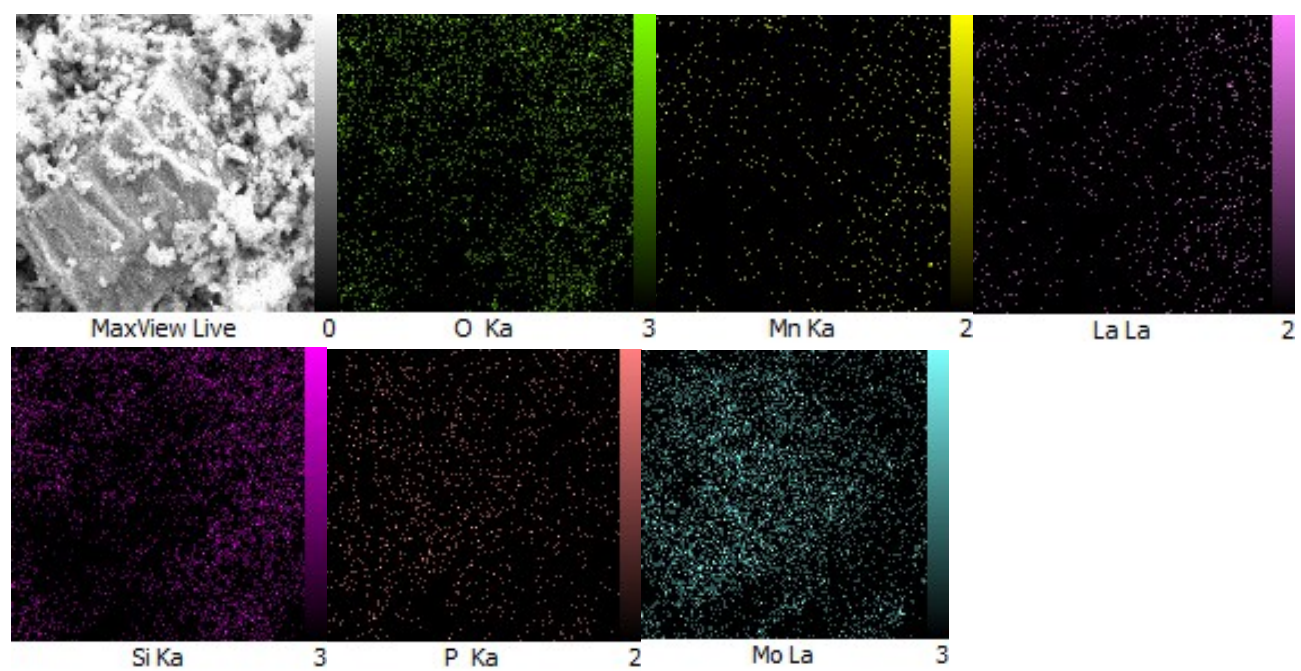
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**Fig. S1.** Element mapping by SEM for  $\text{LaMnO}_3$  NPs.



**Fig. S2.** Element mapping by SEM for hybrid material 1.

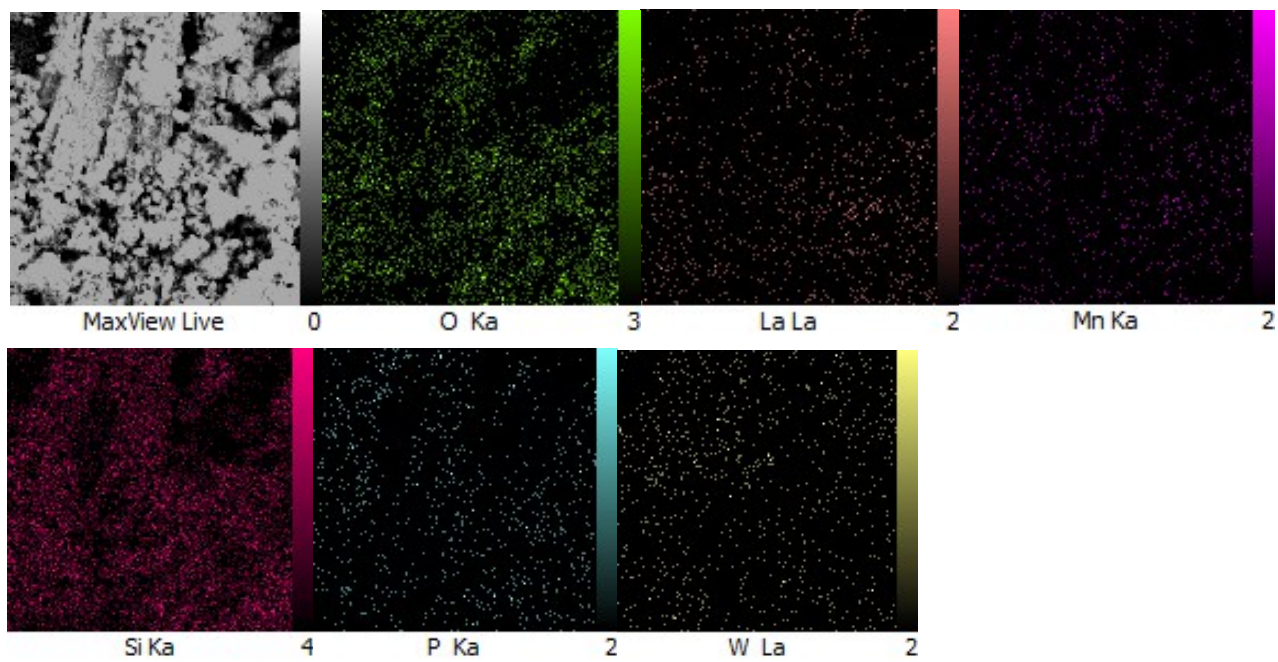


Fig. S3. Element mapping by SEM for hybrid material 2.

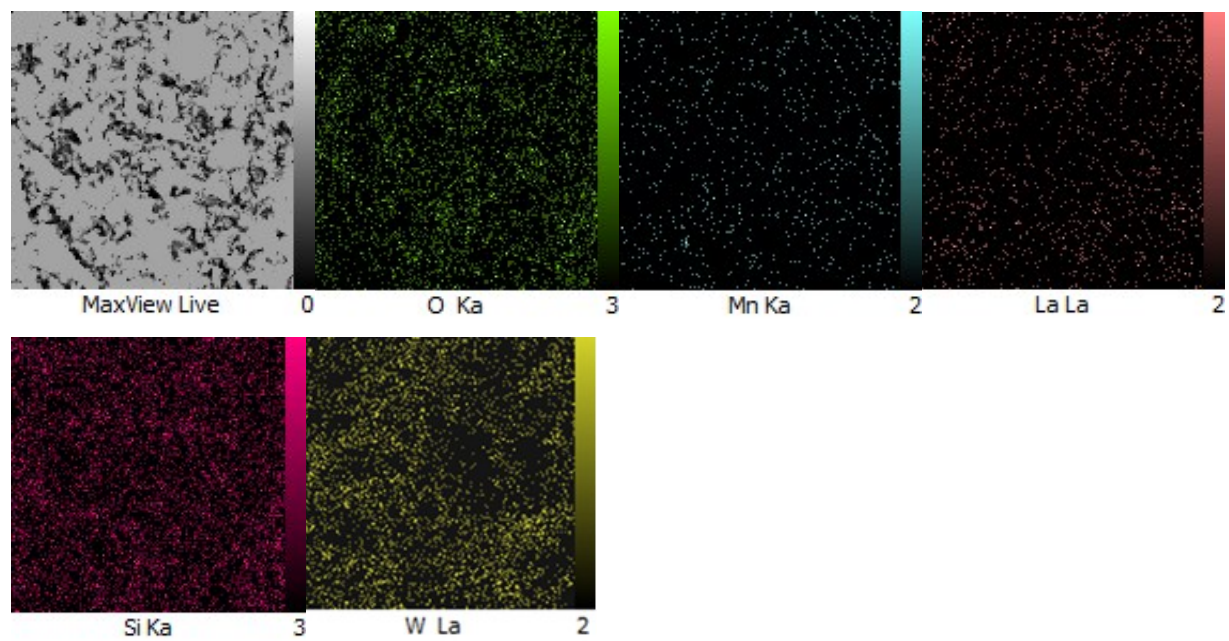


Fig. S4. Element mapping by SEM for hybrid material 3.



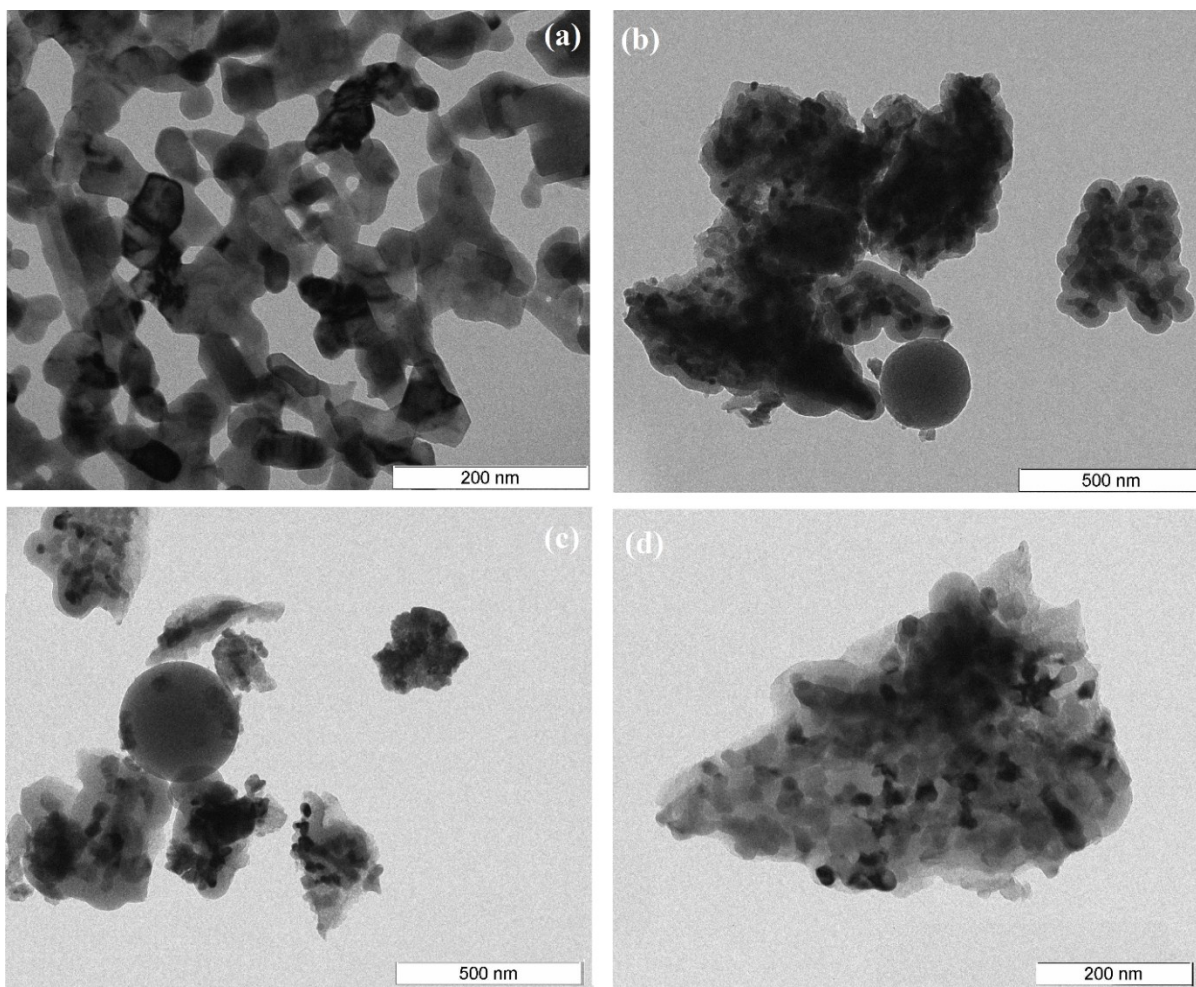


Fig. S5. TEM images of (a)  $\text{LaMnO}_3$ , (b) **1**, (c) **2** and (d) **3**.

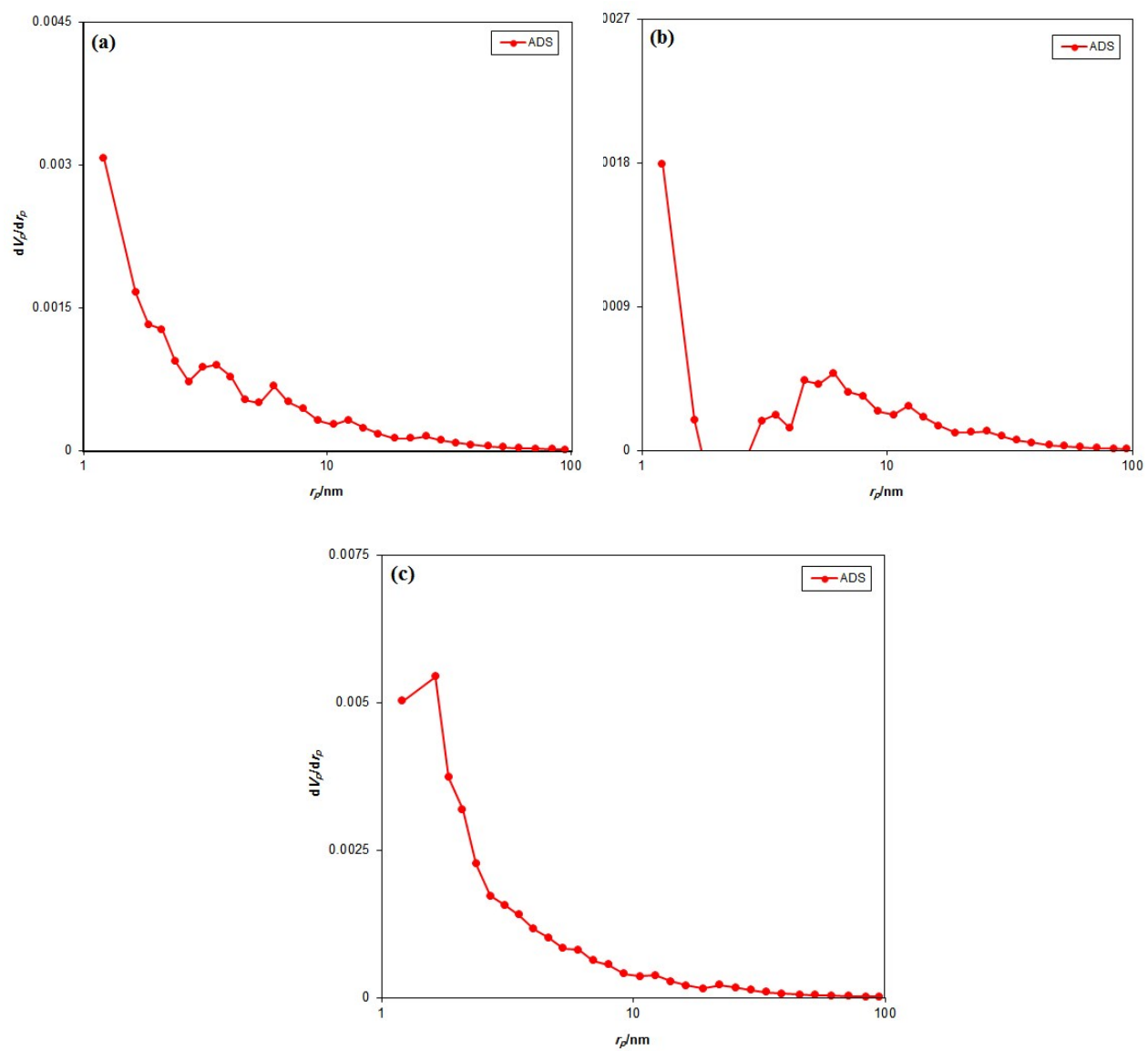
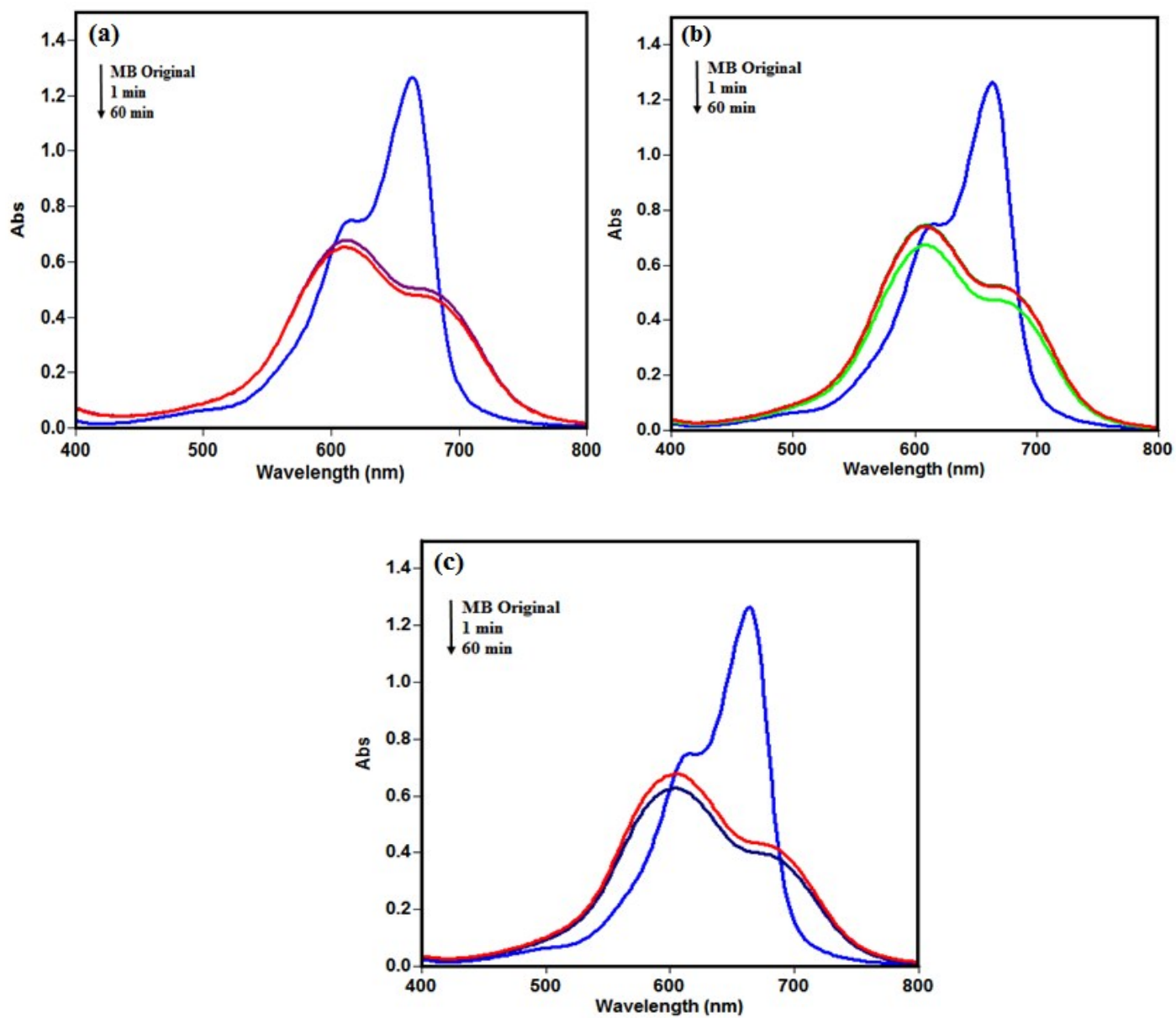
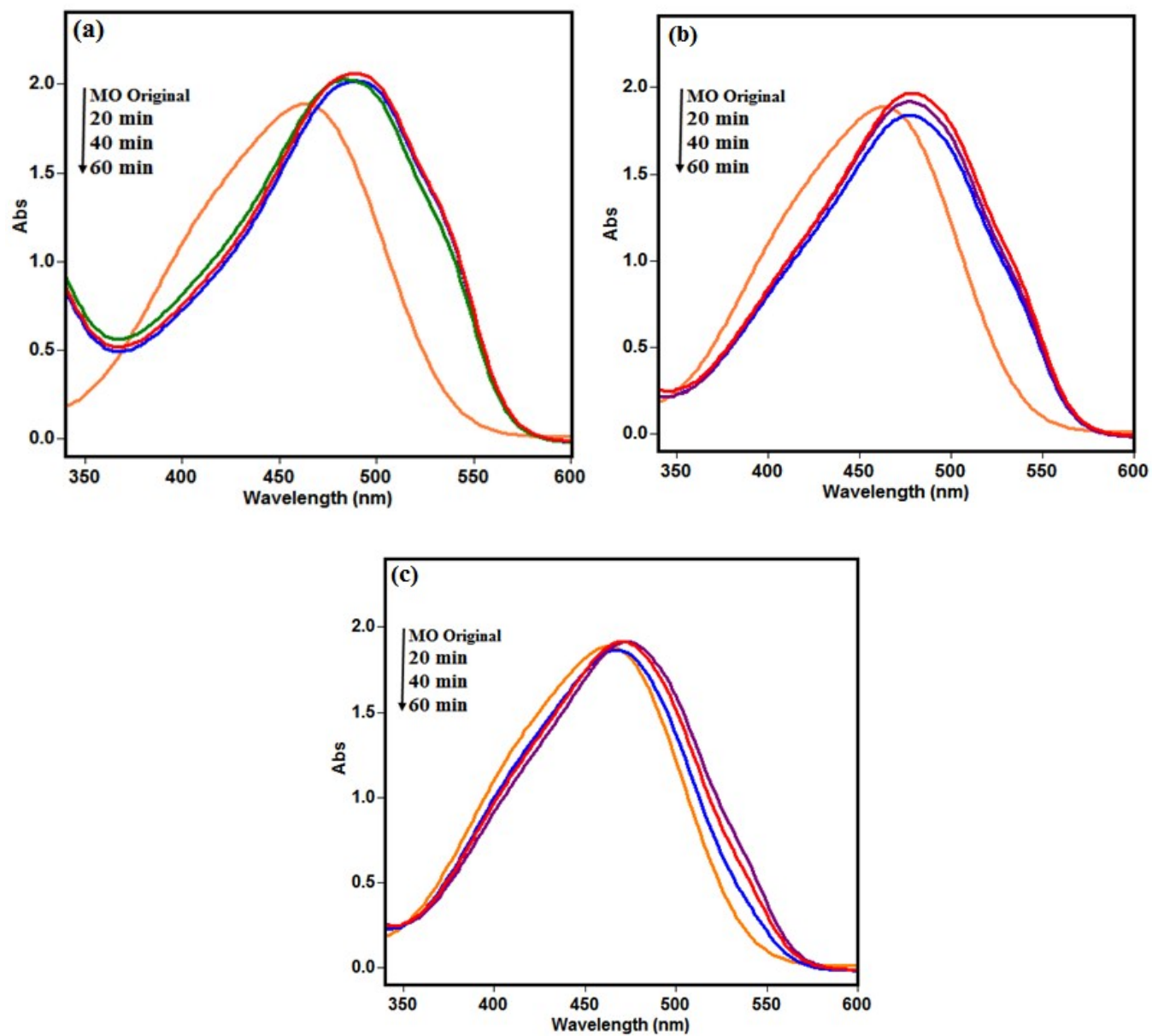


Fig. S6. The pore size distributions obtained by the BJH method for hybrid materials 1-3 (a-c)



**Fig. S7.** The time dependent UV-Vis spectra during adsorption experiments of MB with (a) PMo<sub>12</sub> (b) PW<sub>12</sub>, and (c) SiW<sub>12</sub> ( $[MB] = 25 \text{ mgL}^{-1}$ , and reaction temperature = 25 °C).



**Fig. S8.** The time dependent UV-Vis spectra during adsorption experiments of MO with (a)  $\text{PMo}_{12}$ , (b)  $\text{PW}_{12}$ , and (c)  $\text{SiW}_{12}$  ( $[\text{MO}] = 25 \text{ mgL}^{-1}$ , and reaction temperature =  $25 \text{ }^\circ\text{C}$ ).