Supplementary Information

Top-down synthesis of sponge-like Mn$_3$O$_4$ at low temperature

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N$_2$ adsorption-desorption analysis of manganese formate

The surface area and pore structure of manganese formate was measured with N$_2$ adsorption and desorption isotherms by BET (Brunauere Emmette Teller) and DFT (Density functional theory) methods. Fig. S1 shows N$_2$ adsorption-desorption isotherm of manganese formate prepared with 0.68 M formic acid and DFT pore size distribution. The BET surface area of manganese formate was calculated to be 8.06 m^2/g, which can be ascribed to abundant channels in manganese formate. The average pore diameter is 3.97 nm (see the inset of Fig. S1).
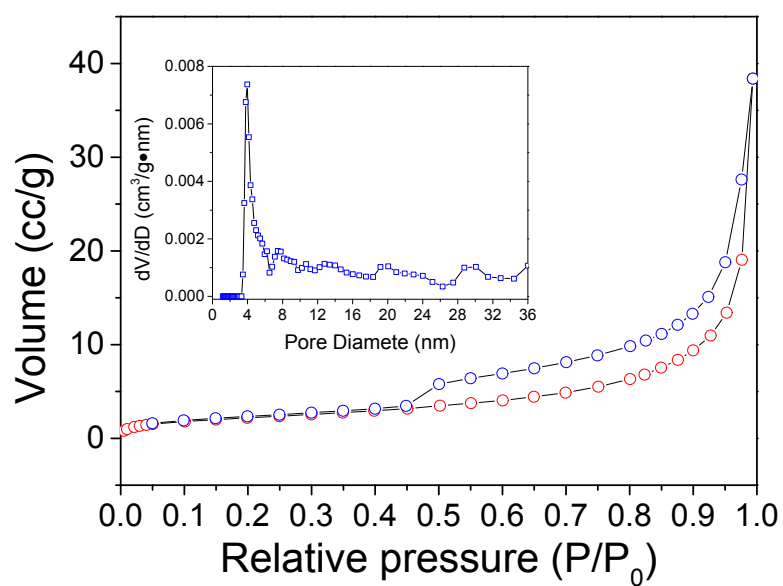
Fig. S1 N_2 adsorption-desorption isotherm of manganese formate prepared with 0.68

M formic acid (Inset: DFT pore size distribution).