

Supporting Information for

Advanced Composite Sorbent with High Thermal Stability and Superior Sorption Capacity without Hysteresis for a Better Thermal Battery

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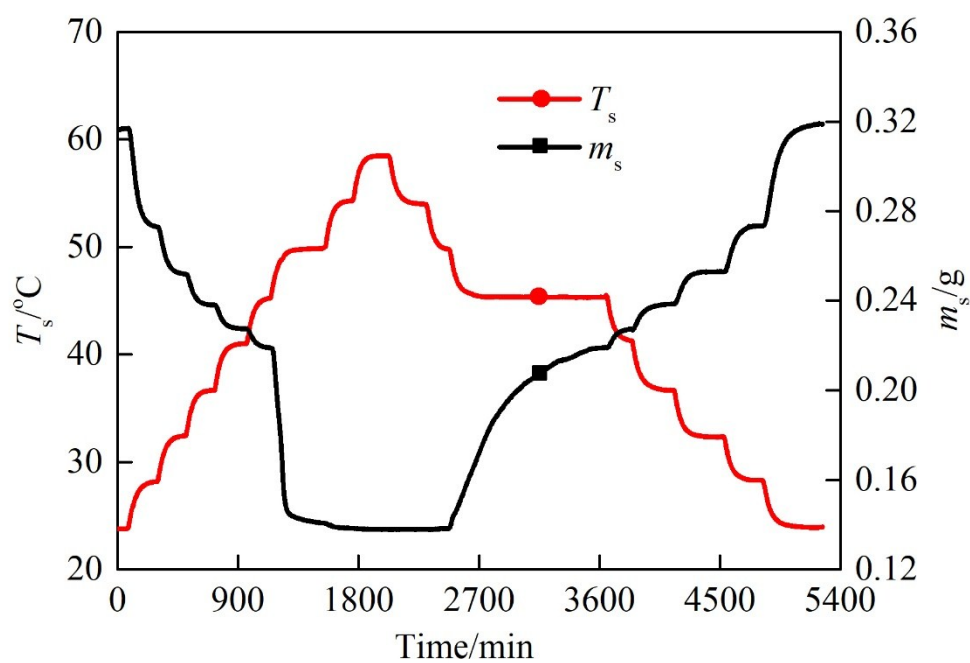


Figure S1. Test procedures of thermodynamic measurement, using condition of 0.87 MPa as example.

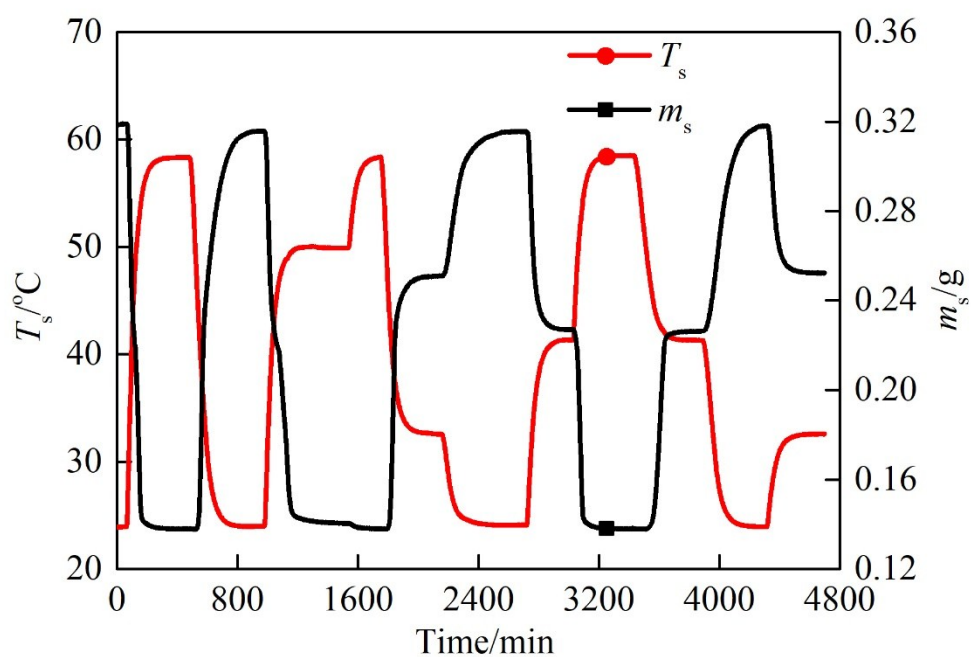


Figure S2. Test procedures of kinetic measurement, using condition of 0.87 MPa as example.

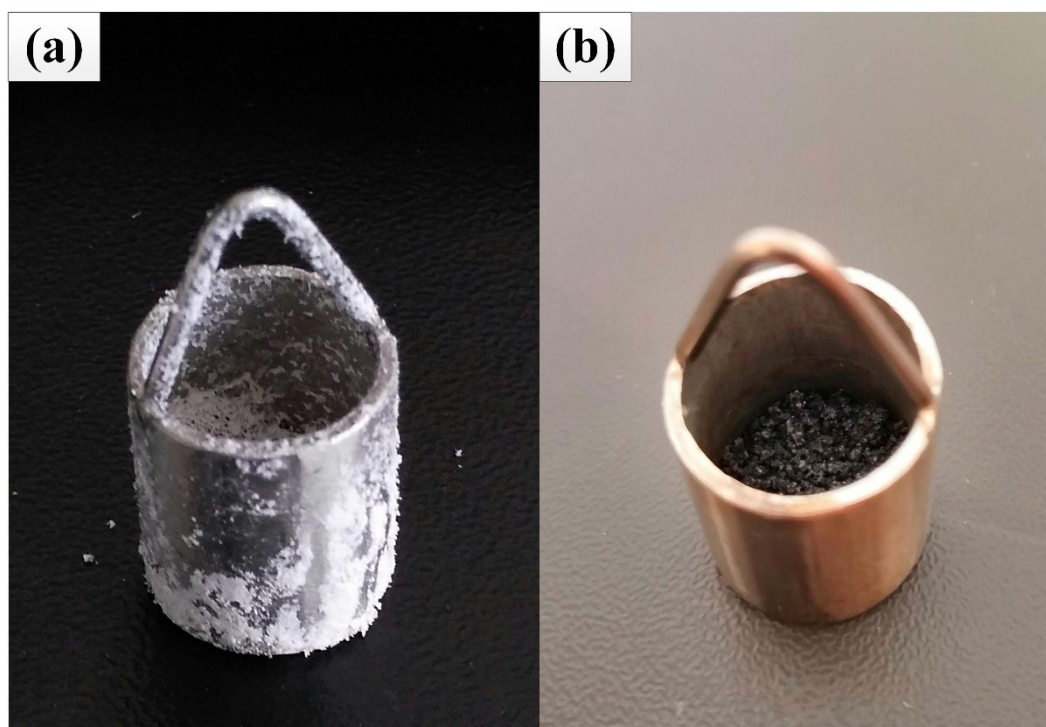


Figure S3. Comparison of NH_4Cl and EWN-Mec during pretreatment with Rubotherm balance: (a) pure NH_4Cl under the condition of vacuum and heating temperature of 60°C , (b) EWN-Mec under the condition of vacuum and heating temperature of 120°C .

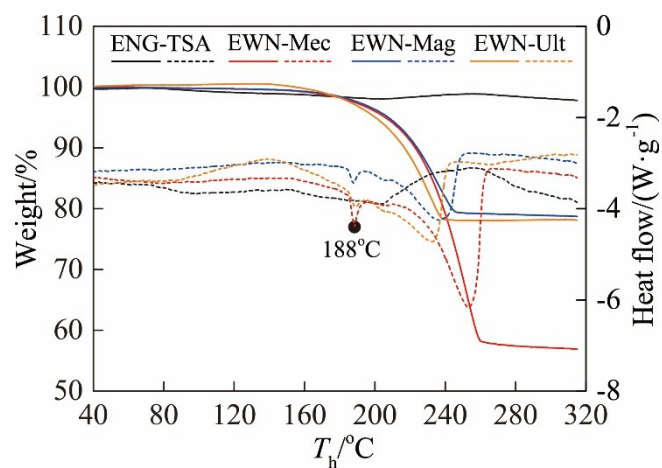


Figure S4. TG curves (solid lines) and DSC curves (dash lines) of ENG-TSA and EWNs.

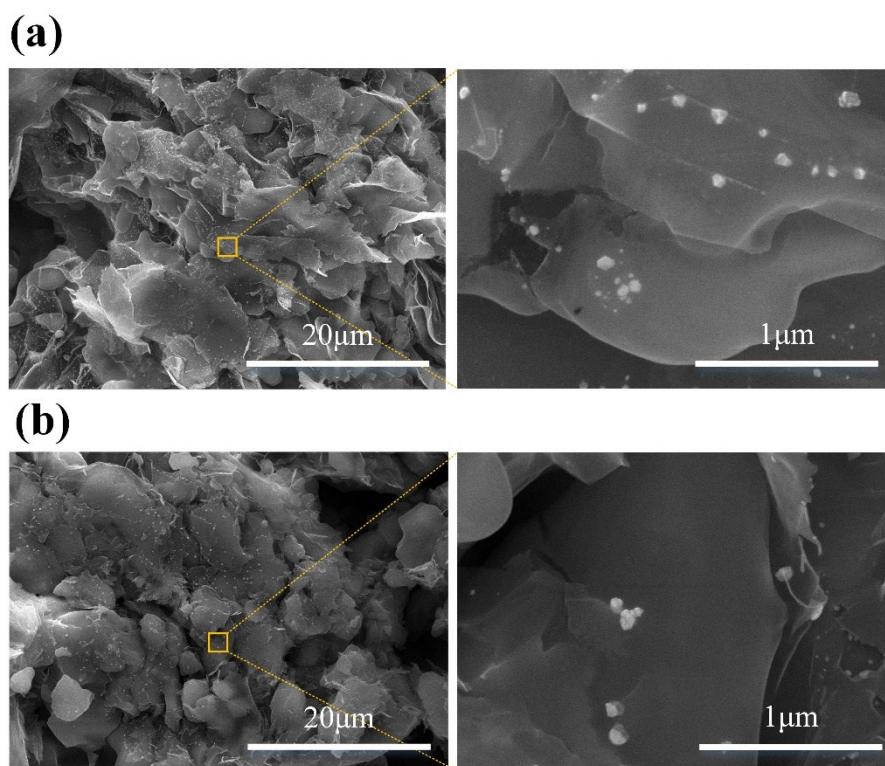


Figure S5. The SEM images: (a) EWN-Mag, (b) EWN-Ult.

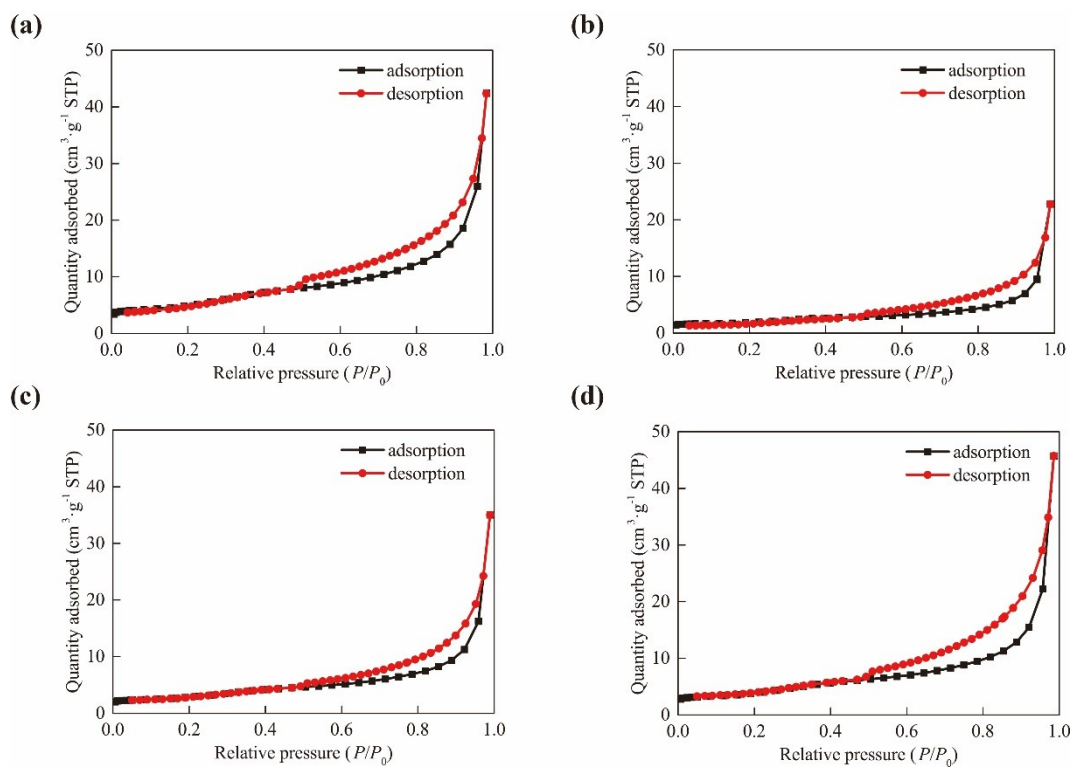


Figure S6. The nitrogen adsorption isotherms of: (a) ENG-TSA, (b) EWN-Mec, (c) EWN-Mag, (d) EWN-Ult.

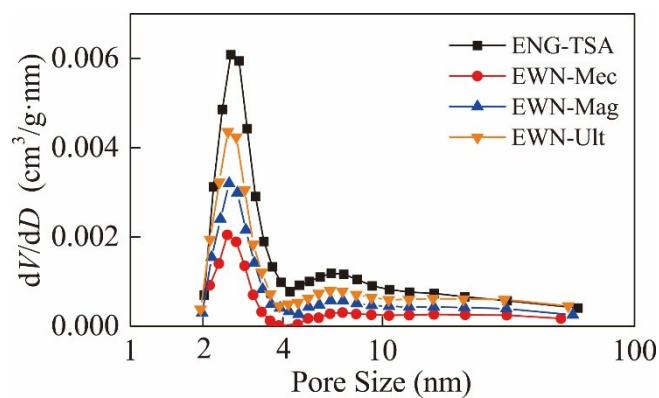


Figure S7. The BJH adsorption dV/dD pore size distribution of ENG-TSA and EWNs.

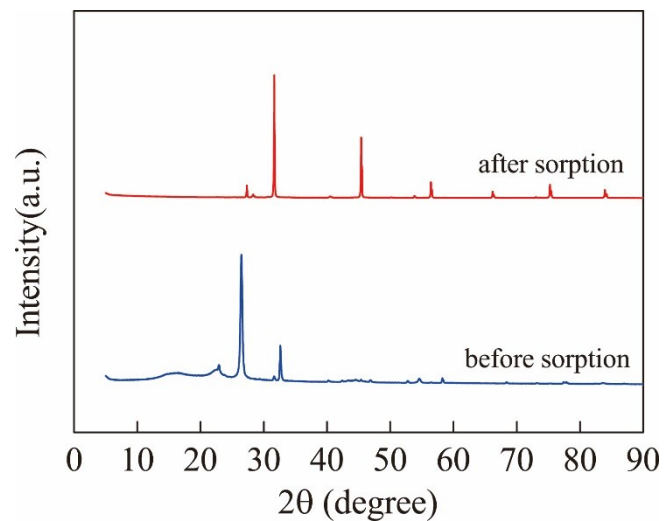


Figure S8. The XRD patterns of EWN-Mec before and after ammonia sorption test.

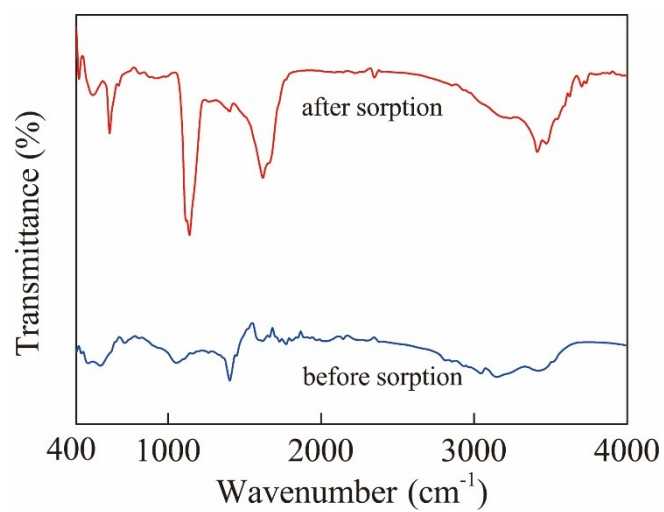


Figure S9. The FTIR spectra of EWN-Mec before and after ammonia sorption test.

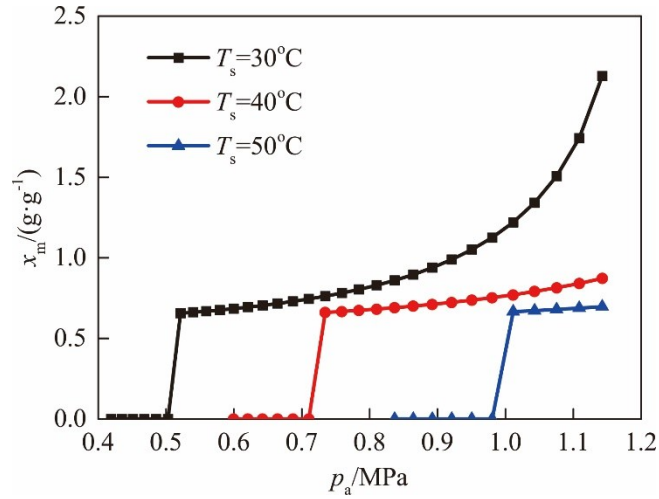


Figure S10. The ammonia sorption isotherms of EWN-Mec deduced from the D-A equation and Clapeyron equation.

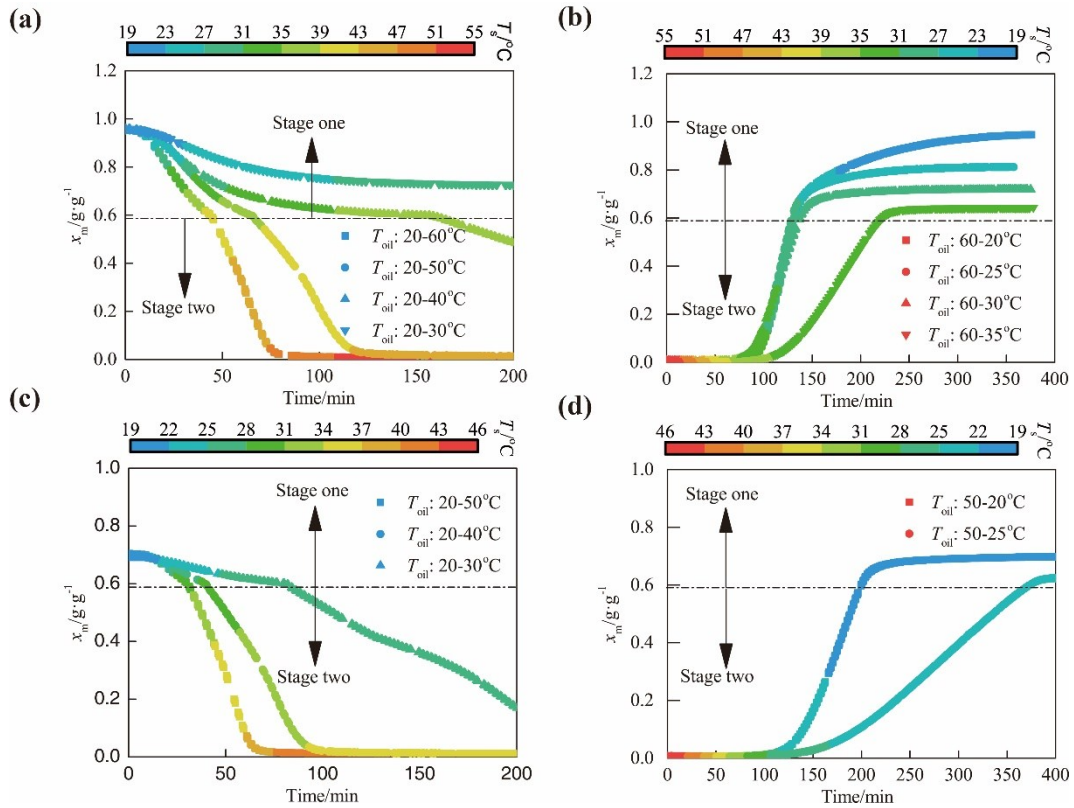


Figure S11. The kinetic characteristics of EWN-Mec-NH₃: (a) desorption processes with the ending T_{oil} ranging from 30°C to 60°C, under 0.63 Mpa, (b) sorption processes with the ending T_{oil} ranging from 20°C to 35°C, under 0.63 Mpa, (c) desorption processes with the ending T_{oil} ranging from 30°C to 50°C, under 0.44 Mpa, (d) sorption processes with the ending T_{oil} ranging from 20°C to 25°C, under 0.44 MPa.

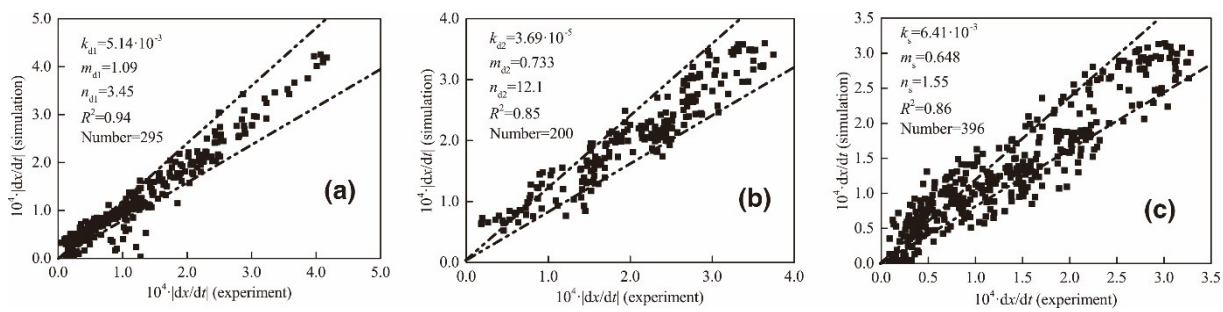


Figure S12. Kinetic simulation results: (a) the first stage desorption process, (b) the second stage desorption process, (c) the sorption process.

Table S1. Surface area, pore volume and pore size of the composites

Summary Report	ENG-TSA	EWN-Mec	EWN-Mag	EWN-Ult
BET Surface Area ($\text{m}^2 \cdot \text{g}^{-1}$)	18	7	11	14
Total pore volume ($\text{cm}^3 \cdot \text{g}^{-1}$)	0.033	0.013	0.019	0.028
Pore diameter (nm)	2.5	2.4	2.5	2.4

Table S2. Kinetic model for EWN-Mec-NH₃, where k , m and n are the reaction rate, reaction order and pressure potential parameter, subscripts s and d represent sorption and desorption, respectively.

Process	Conditions	Kinetic model
Des. $\frac{dx_m}{dt}$	$T_s < T_c$	$-k_{1d} \cdot [x_m(T_s) - x_{eq}(T_s)]^{m_{1d}} \cdot \left(\frac{p_s}{p_c}\right)^{n_{1d}}$
	$T_s > T_c$	$-k_{2d} \cdot [x_m(T_s) - 0]^{m_{2d}} \cdot \left(\frac{p_s}{p_c}\right)^{n_{2d}}$
Sor. $\frac{dx_m}{dt}$	$T_s > T_c$	0
	$T_s < T_c$	$k_s \cdot [x_{eq}(T_s) - x_m(T_s)]^{m_s} \cdot \left(1 - \frac{p_s}{p_c}\right)^{n_s}$