

## Supporting Information

# Insights into rheological behavior of aqueous dispersions of synthetic saponite: effects of saponite composition and sodium polyacrylate

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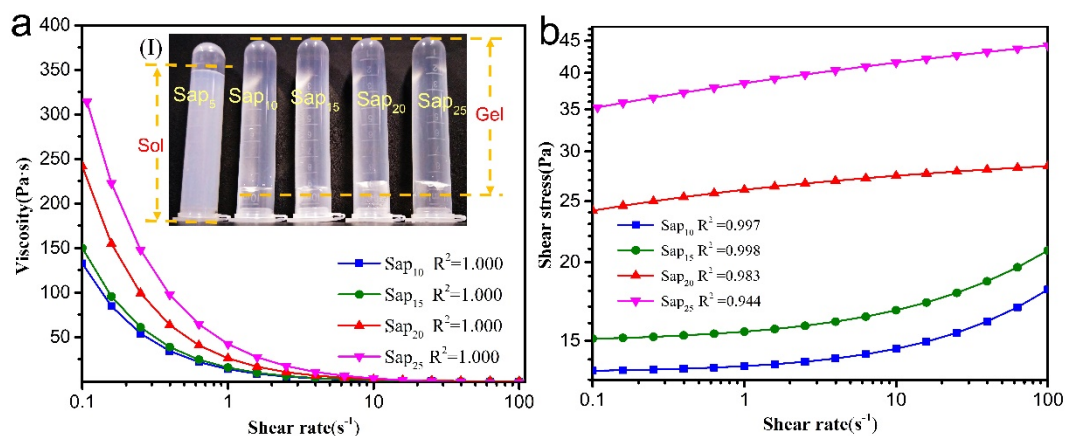
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Number of pages: 11

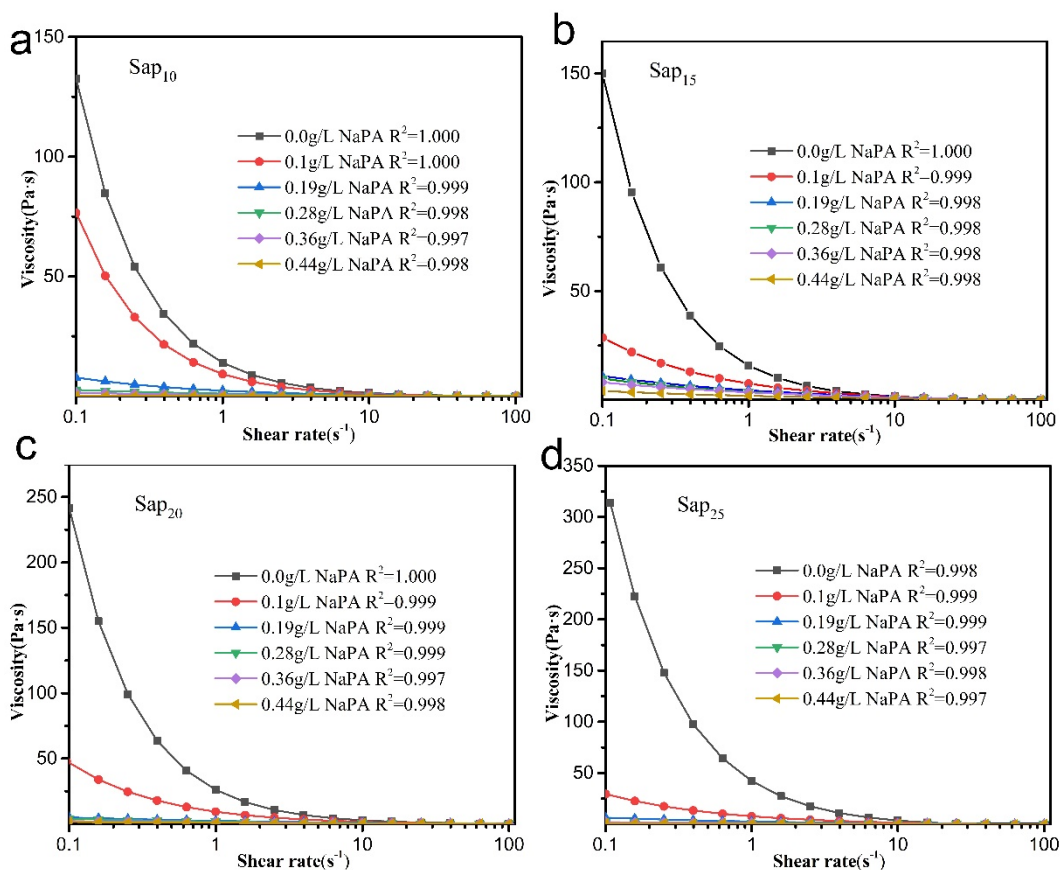
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## Table of Contents:

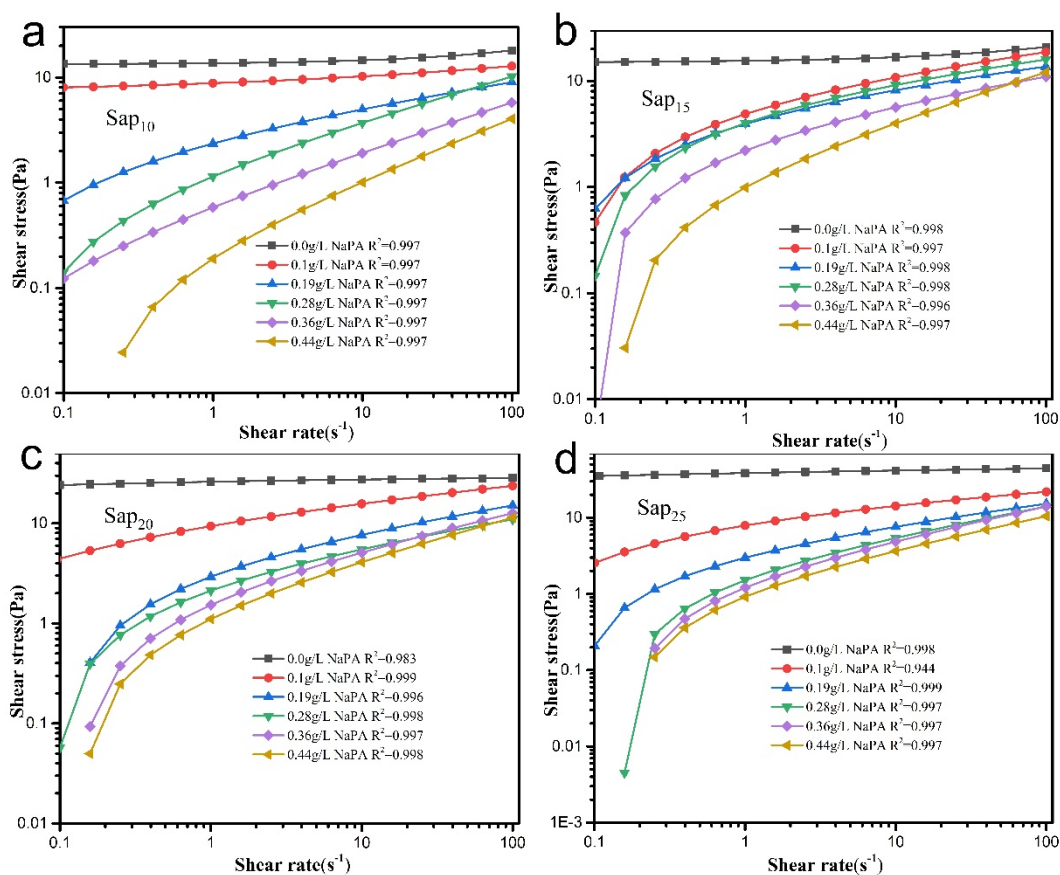
<b>Fig. S1.</b> Sisko model fitted curves of viscosity and Herschel–Bulkley model fitted curves of shear stress as a function of shear rate for Sap <sub>x</sub> dispersions.....	<b>S3</b>
<b>Fig. S2.</b> Sisko model fitted curves of viscosity as a function of shear rate for Sap <sub>x</sub> -NaPA <sub>y</sub> dispersion.....	<b>S4</b>
<b>Fig. S3.</b> Herschel–Bulkley model fitted curves of shear stress as a function of shear rate for Sap <sub>x</sub> -NaPA <sub>y</sub> dispersions.....	<b>S5</b>
<b>Fig. S4.</b> Thixotropic loops as a function of shear rate for Sap <sub>x</sub> -NaPA <sub>y</sub> dispersions.....	<b>S6</b>
<b>Fig. S5.</b> Storage modulus (G') and loss modulus (G'') of Sap <sub>x</sub> -NaPA <sub>y</sub> dispersions.....	<b>S7</b>
<b>Fig. S6.</b> FTIR of NaPA, Sap <sub>x</sub> -control and Sap <sub>x</sub> -NaPA <sub>0.44</sub> .....	<b>S8</b>
<b>Fig. S7.</b> SEM image of Sap <sub>5</sub> .....	<b>S9</b>
<b>Fig. S8.</b> Pore size distribution of Sap <sub>x</sub> .....	<b>S10</b>



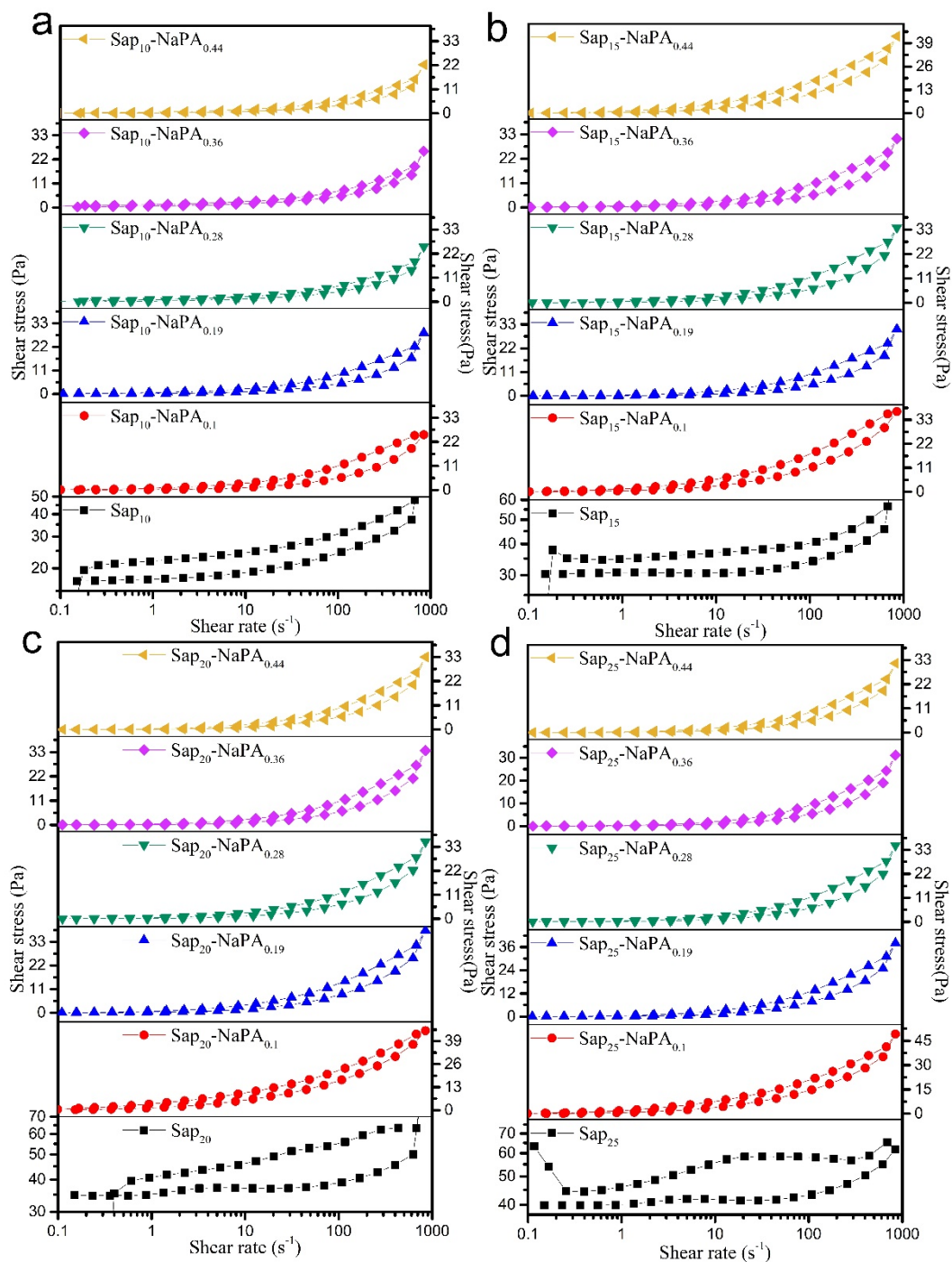
**Fig. S1.** (a) Sisko model fitted curves of viscosity and (b) Herschel–Bulkley model fitted curves of shear stress as a function of shear rate for Sap<sub>x</sub> dispersions. Sap<sub>x</sub> means the Sap synthesized at the Si/Al molar ratio of 10, 15, 20 and 25. The insert (I) is the snapshot of Sap dispersion after 7 d standing.



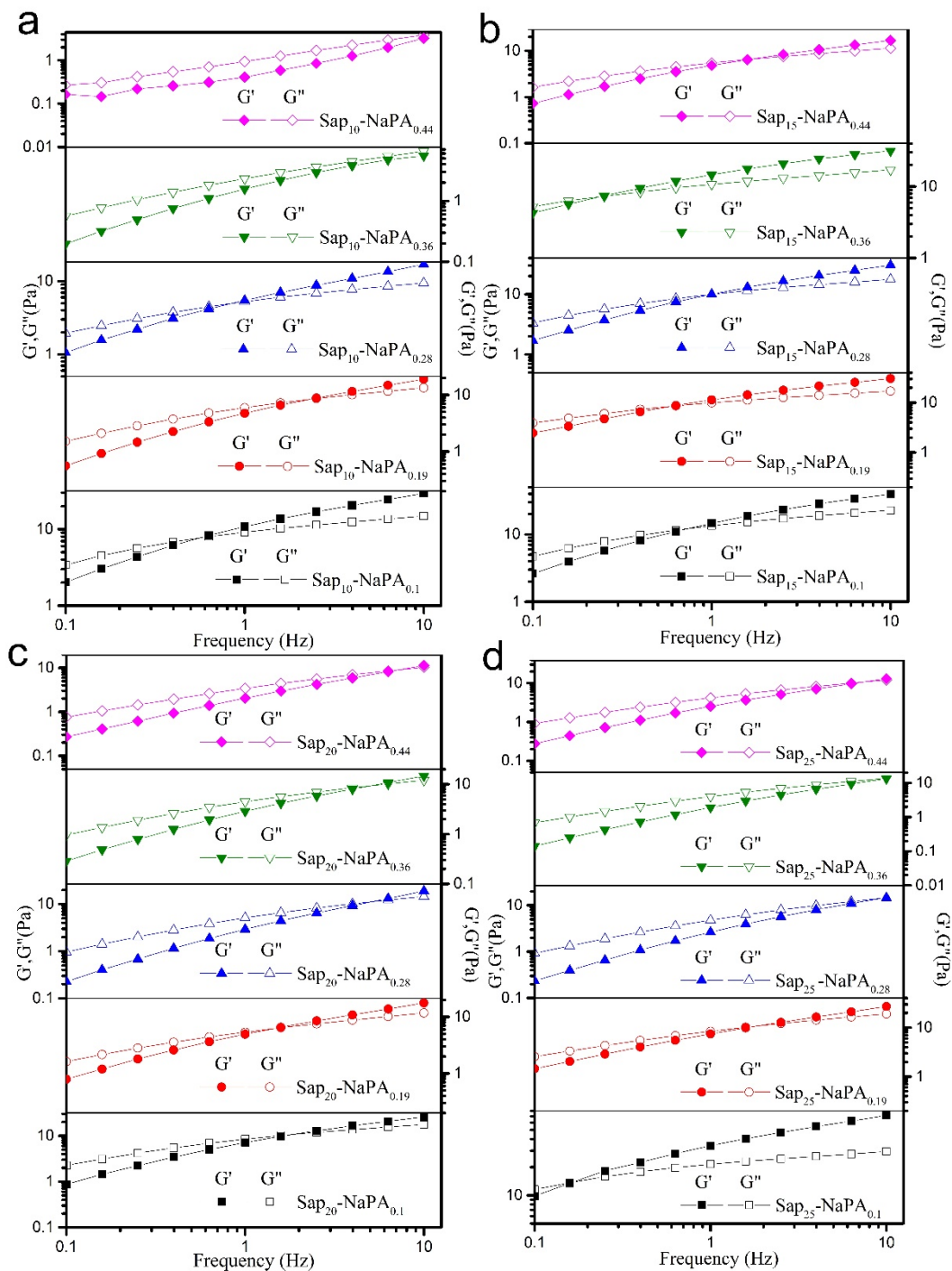
**Fig. S2.** Sisko model fitted curves of viscosity as a function of shear rate for (a) Sap<sub>10</sub>-NaPA<sub>y</sub>, (b) Sap<sub>15</sub>-NaPA<sub>y</sub>, (c) Sap<sub>20</sub>-NaPA<sub>y</sub> and (d) Sap<sub>25</sub>-NaPA<sub>y</sub> dispersions. Sap<sub>x</sub>-NaPA<sub>y</sub>: the Sap<sub>x</sub> dispersed in deionized water followed by 7 d standing and then the addition of NaPA to reach the concentration of 0.1, 0.19, 0.28, 0.36, and 0.44 g/L, respectively, before drying in an oven. Sap<sub>x</sub> means the Sap synthesized at the Si/Al molar ratio of 10, 15, 20 and 25.



**Fig. S3.** Herschel–Bulkley model fitted curves of shear stress as a function of shear rate for (a) Sap<sub>10</sub>-NaPA<sub>y</sub>, (b) Sap<sub>15</sub>-NaPA<sub>y</sub>, (c) Sap<sub>20</sub>-NaPA<sub>y</sub> and (d) Sap<sub>25</sub>-NaPA<sub>y</sub> dispersions. Sap<sub>x</sub>-NaPA<sub>y</sub>: the Sap<sub>x</sub> dispersed in deionized water followed by 7 d standing and the addition of NaPA to reach the concentration of 0.1, 0.19, 0.28, 0.36, and 0.44 g/L, respectively, before drying in an oven. Sap<sub>x</sub> means the Sap synthesized at the Si/Al molar ratio of 10, 15, 20 and 25.

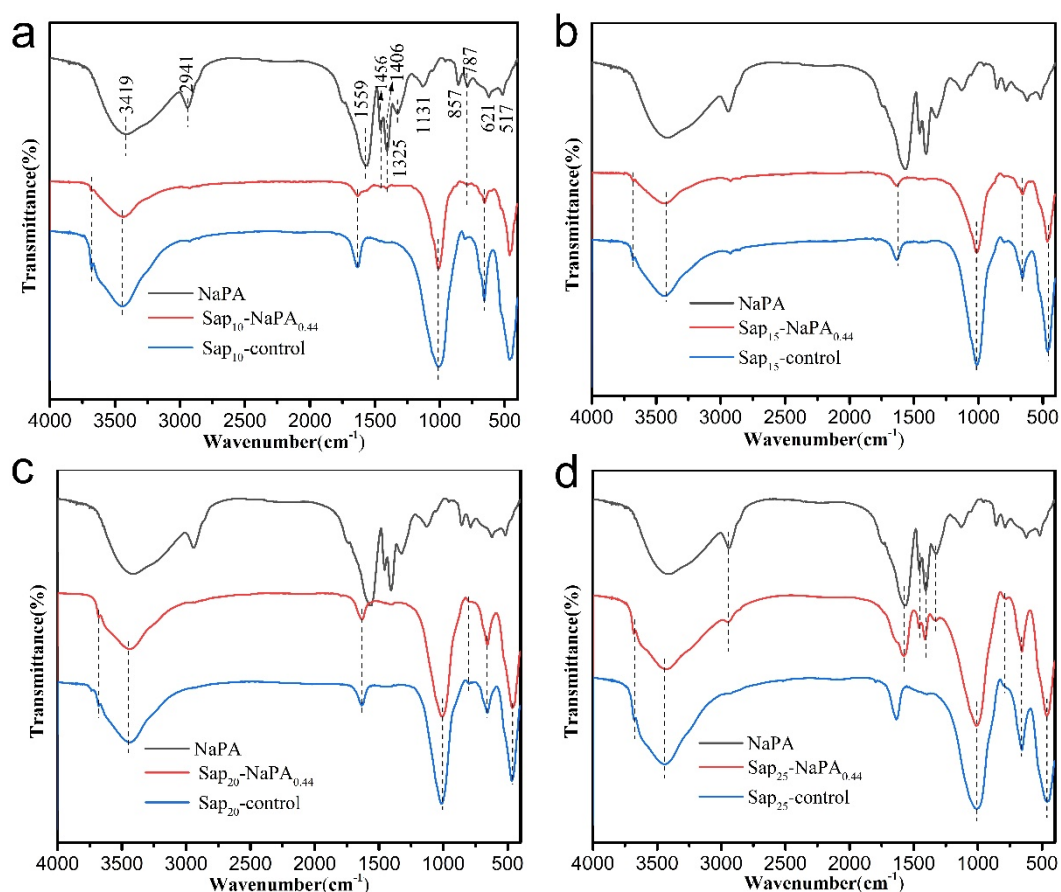


**Fig. S4.** Thixotropic loops as a function of shear rate for (a) Sap<sub>10</sub>-NaPA<sub>y</sub>, (b) Sap<sub>15</sub>-NaPA<sub>y</sub>, (c) Sap<sub>20</sub>-NaPA<sub>y</sub> and (d) Sap<sub>25</sub>-NaPA<sub>y</sub> dispersions (in log-log mode). Sap<sub>x</sub>-NaPA<sub>y</sub>: the Sap<sub>x</sub> dispersed in deionized water followed by 7 d standing and the addition of NaPA to reach the concentration of 0.1, 0.19, 0.28, 0.36, and 0.44 g/L, respectively, before drying in an oven. Sap<sub>x</sub> means the Sap synthesized at the Si/Al molar ratio of 10, 15, 20 and 25.



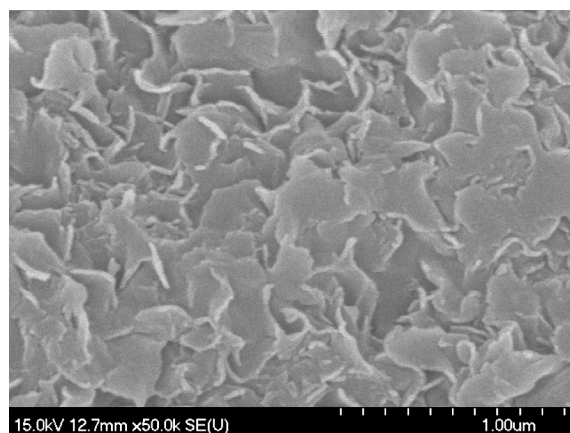
**Fig. S5.** Storage modulus ( $G'$ ) and loss modulus ( $G''$ ) of (a)  $\text{Sap}_{10}\text{-NaPA}_y$ , (b)  $\text{Sap}_{15}\text{-NaPA}_y$ , (c)  $\text{Sap}_{20}\text{-NaPA}_y$  and (d)  $\text{Sap}_{25}\text{-NaPA}_y$  dispersions.  $\text{Sap}_x\text{-NaPA}_y$ : the  $\text{Sap}_x$  dispersed in deionized water followed by 7 d standing and the addition of NaPA to reach the concentration of 0.1, 0.19, 0.28, 0.36, and 0.44 g/L, respectively, before drying in an oven.  $\text{Sap}_x$  means the Sap synthesized at the Si/Al molar ratio of 10, 15, 20 and 25.



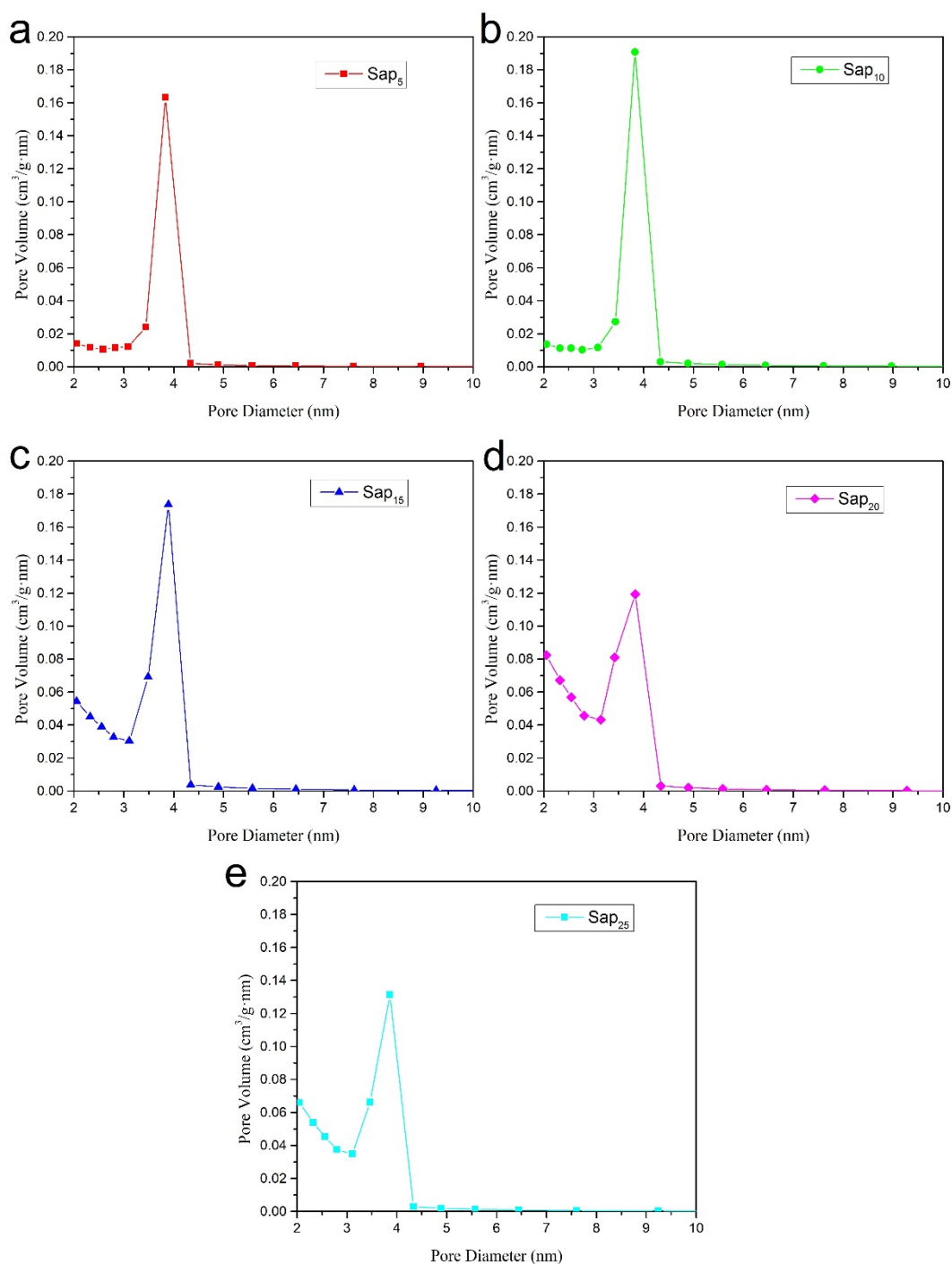


**Fig. S6.** FTIR of (a) Sap<sub>10</sub>-control and Sap<sub>10</sub>-NaPA<sub>0.44</sub>, (b) Sap<sub>15</sub>-control and Sap<sub>15</sub>-NaPA<sub>0.44</sub>, (c) Sap<sub>20</sub>-control and Sap<sub>20</sub>-NaPA<sub>0.44</sub>, (d) Sap<sub>25</sub>-control and Sap<sub>25</sub>-NaPA<sub>0.44</sub>, and NaPA. Sap<sub>x</sub>-NaPA<sub>0.44</sub>: the Sap<sub>x</sub> dispersed in deionized water followed by 7 d standing and the addition of NaPA to reach the concentration of 0.44 g/L, before drying in an oven. Sap<sub>x</sub> means the Sap synthesized at the Si/Al molar ratio of 10, 15, 20 and 25.





**Fig. S7.** SEM image of Saps



**Fig. S8.** Pore size distribution of Sap<sub>x</sub>

The average pore diameter of Sap<sub>5</sub>, Sap<sub>10</sub>, Sap<sub>15</sub>, Sap<sub>20</sub> and Sap<sub>25</sub> is 3.61, 3.68, 3.34, 3.08 and 3.16 nm, respectively. The BJH desorption cumulative pore volume of Sap<sub>5</sub>, Sap<sub>10</sub>, Sap<sub>15</sub>, Sap<sub>20</sub> and Sap<sub>25</sub> between 1.70 nm and 300.00 nm were 0.110, 0.130, 0.166, 0.176 and 0.156 cm<sup>3</sup>/g, respectively. But the BJH desorption cumulative pore volume

of Sap<sub>5</sub>, Sap<sub>10</sub>, Sap<sub>15</sub>, Sap<sub>20</sub> and Sap<sub>25</sub> between 2.05 nm and 3.10 nm were 0.0122, 0.0118, 0.0416, 0.0624 and 0.0490 cm<sup>3</sup>/g, respectively. The cumulative pore volume increased with the increase of Si/Al ratio ranging from 5 to 20. Sap<sub>20</sub> shows the lowest average pore size and the highest BJH desorption cumulative pore volume among the synthetic Sap.