

# Electronic Supplementary Material

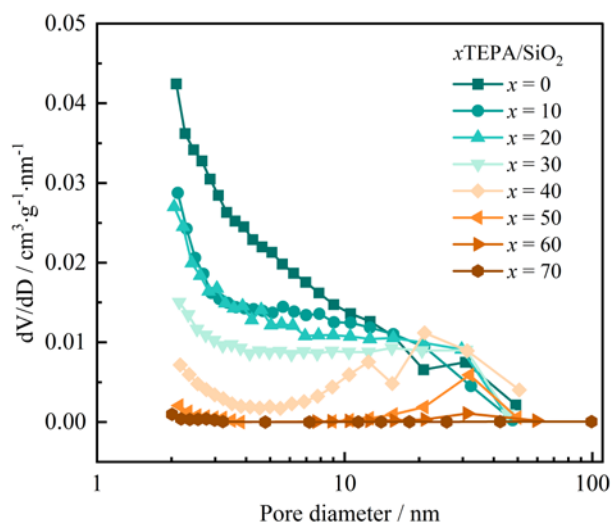
## Structure-performance relationship of additive-incorporated tetraethylenepentamine-functionalized SiO<sub>2</sub> in direct air capture of CO<sub>2</sub>

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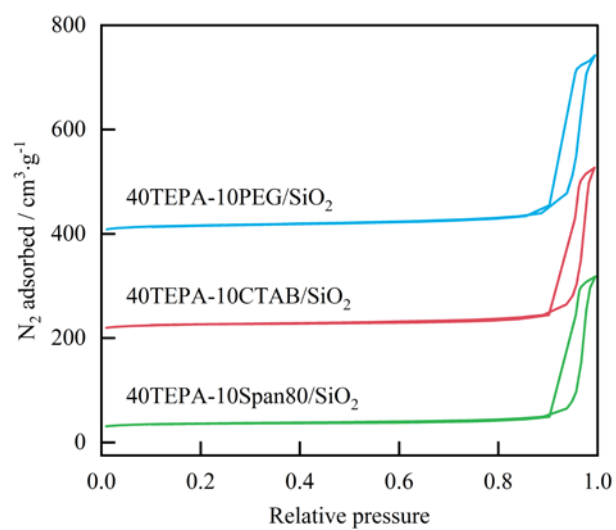
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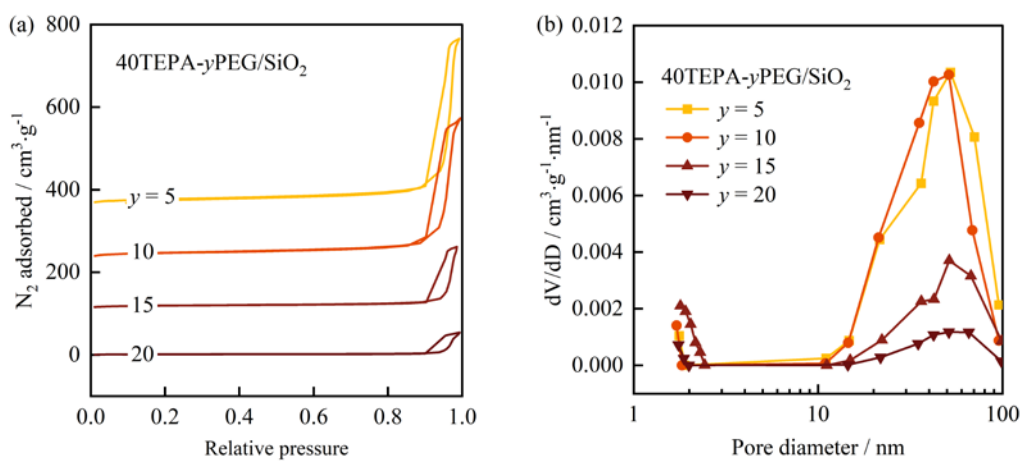
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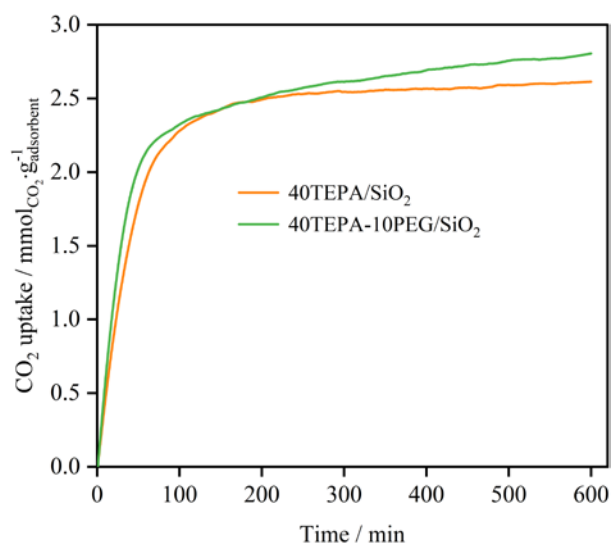
**Fig. S1** Pore size distribution curves of  $x$ TEPA/SiO<sub>2</sub> adsorbents with varying TEPA contents.



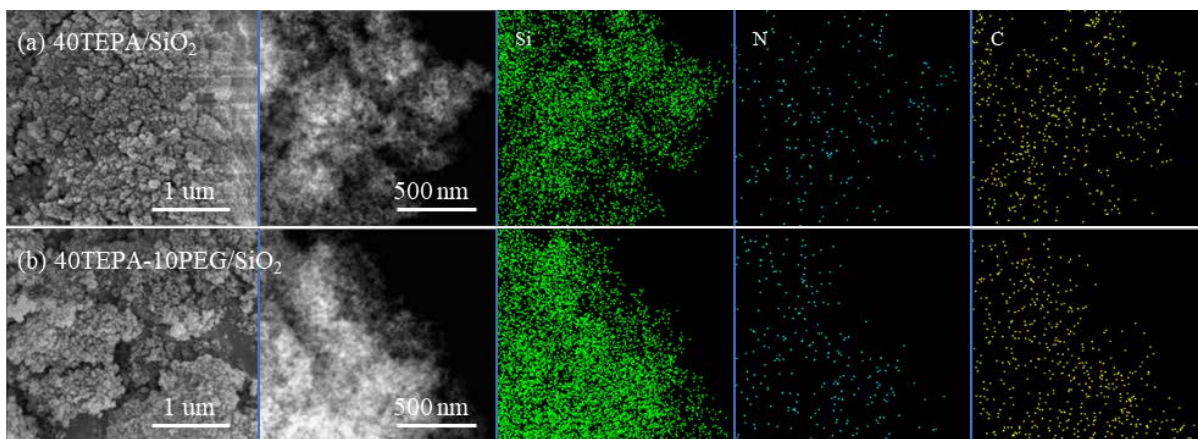
**Fig. S2** N<sub>2</sub> adsorption-desorption isotherms of 40TEPA-10PEG/SiO<sub>2</sub>, 40TEPA-10CTAB/SiO<sub>2</sub>, and 40TEPA-10Span80/SiO<sub>2</sub> adsorbents.



**Fig. S3** (a)  $N_2$  adsorption-desorption isotherms and (b) pore size distribution curves of 40TEPA-yPEG/SiO<sub>2</sub> adsorbents with varying PEG contents.

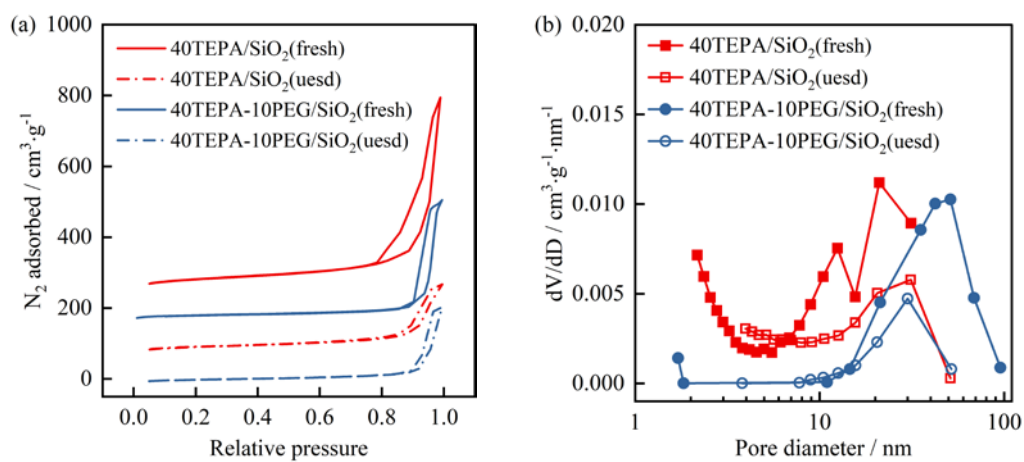


**Fig. S4**  $CO_2$  uptake of 40TEPA/SiO<sub>2</sub> and 40TEPA-10PEG/SiO<sub>2</sub> adsorbents in a TGA (adsorption at 400 ppm  $CO_2/N_2$  and 30 °C).



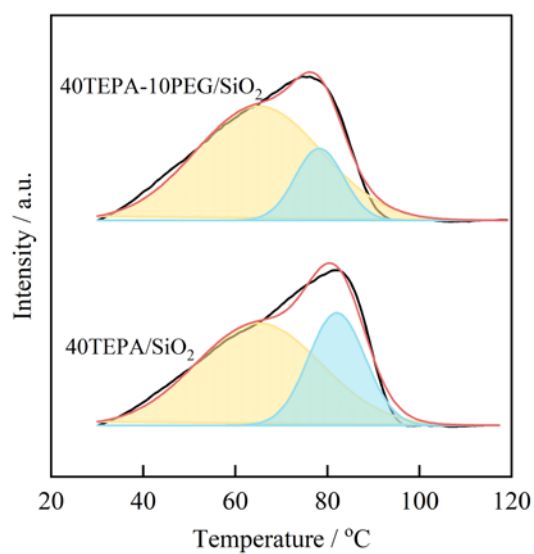
**Fig. S5** FESEM and EDS mapping images of 20 cycle-used adsorbents:

(a) 40TEPA/SiO<sub>2</sub> and (b) 40TEPA-10PEG/SiO<sub>2</sub>.

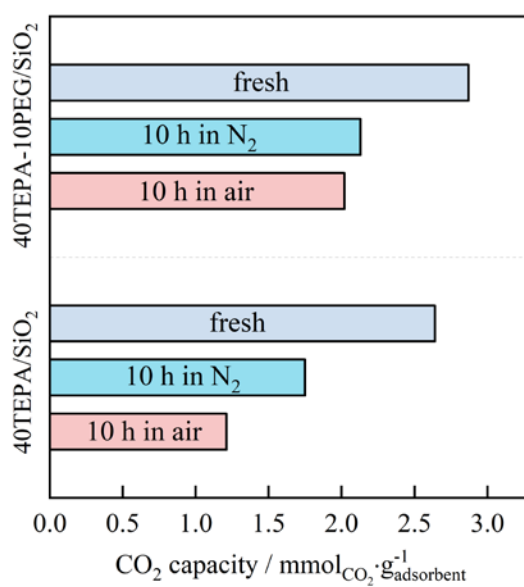


**Fig. S6** (a)  $N_2$  adsorption-desorption isotherms and (b) pore size distribution curves of fresh and

20 cycle-used 40TEPA/SiO<sub>2</sub> and 40TEPA-10PEG/SiO<sub>2</sub> adsorbents.



**Fig. S7** CO<sub>2</sub>-TPD profiles of 20 cycle-used 40TEPA/SiO<sub>2</sub> and 40TEPA-10PEG/SiO<sub>2</sub> adsorbents.



**Fig. S8** CO<sub>2</sub> adsorption capacity of 40TEPA/SiO<sub>2</sub> and 40TEPA-10PEG/SiO<sub>2</sub> in different states.