

Supporting Information for

**Polyethyleneimine-modified amorphous silica for the
selective adsorption of CO₂/N₂ at high temperature**

Cheng Li,[†] Xiaoqing Wang,[†] Anjie Yang, Peng Chen, Tianxiang Zhao, and Fei Liu**

*Key Laboratory of Green Chemical and Clean Energy Technology, School of Chemistry and
Chemical Engineering, Guizhou University, Guiyang 550025, P. R. China*

**Corresponding author: txzhao3@gzu.edu.cn (T.X. Zhao) and ce.feiliu@gzu.edu.cn (F. Liu).*

[†]C. Li and X.Q. Wang authors contributed equally.

Table S1. Fitting parameters of DSLF isotherm model for pure isotherms of CO₂.

Item	$T(^{\circ}\text{C})$	q_1 (mmol·g ⁻¹)	q_2 (mmol·g ⁻¹)	b_1/kPa^{-1}	b_2/kPa^{-1}	n_1	n_2	R^2
CO ₂	0	1.066	2.320	4.139×10 ³	2.140×10 ⁻¹	0.777	0.932	0.9994
	25	1.326	1.817	7.502×10 ²	3.006×10 ⁻¹	0.720	0.986	0.9999
	70	2.030	0.737	9.517×10	1.095	0.833	1.005	0.9999
CH ₄	0	0.02	0.258	5.235×10 ⁻²	2.875×10 ⁻¹	6.999	0.942	0.9998
	25	0.0738	0.0136	3.839×10 ⁻¹	5.729×10	1.552	1.800	0.9982
	70	6.74×10 ⁻¹⁷	0.161	1.168×10	3.817×10 ⁻²	0.3185	1.861×10 ⁻¹⁵	0.9999
N ₂	0	0.188	6.29×10 ⁻³	1.5216×10 ⁻¹	3.662×10 ⁻²	0.760	12.270	0.9994
	25	0.01	0.0277	2.815×10 ⁻¹	1.578	4.795	0.800	0.9974

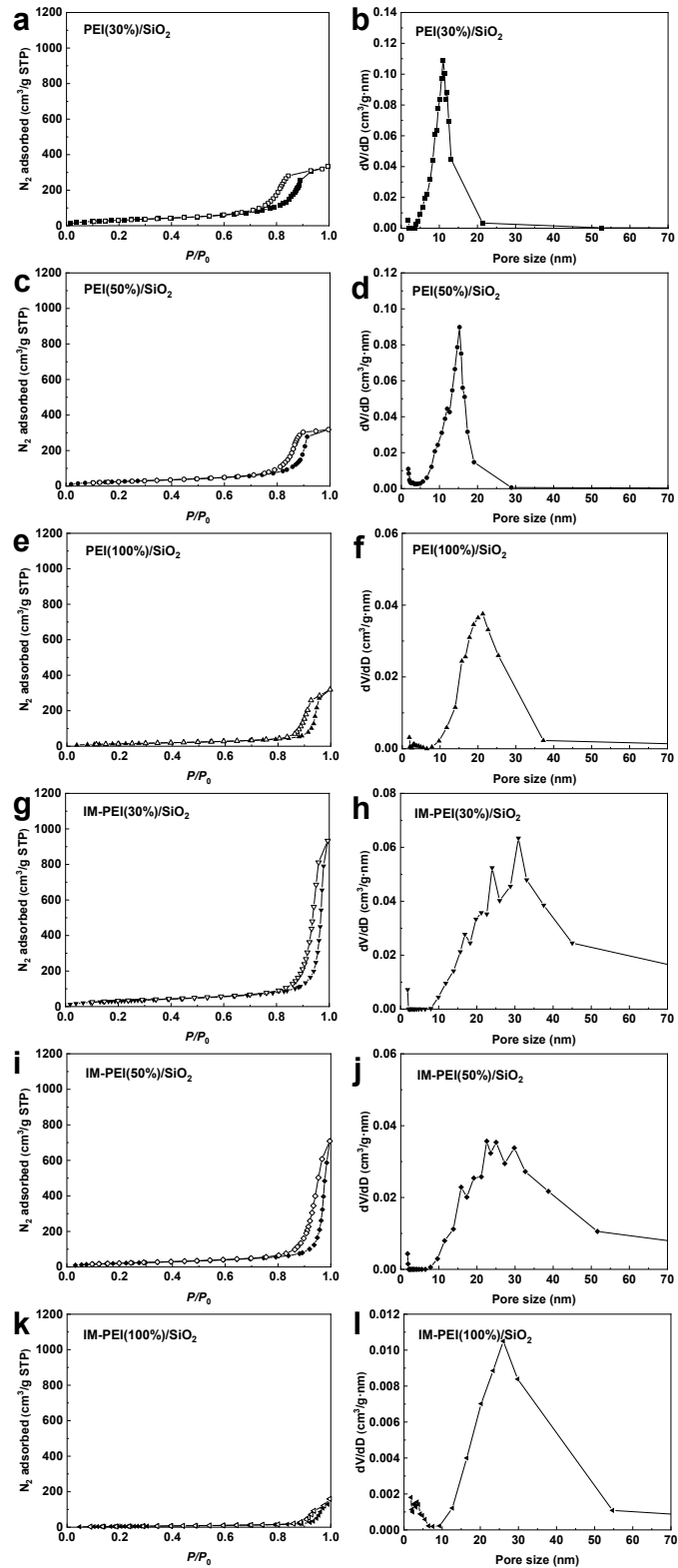


Figure S1. Adsorption and desorption isotherms and BJH pore size distributions of (a, b) PEI(30%)/SiO₂, (c, d) PEI(50%)/SiO₂, (e, f) PEI(100%)/SiO₂, (g, h) IM-PEI(30%)/SiO₂, (i, j) IM-PEI(50%)/SiO₂ and (k, l) IM-PEI(100%)/SiO₂.

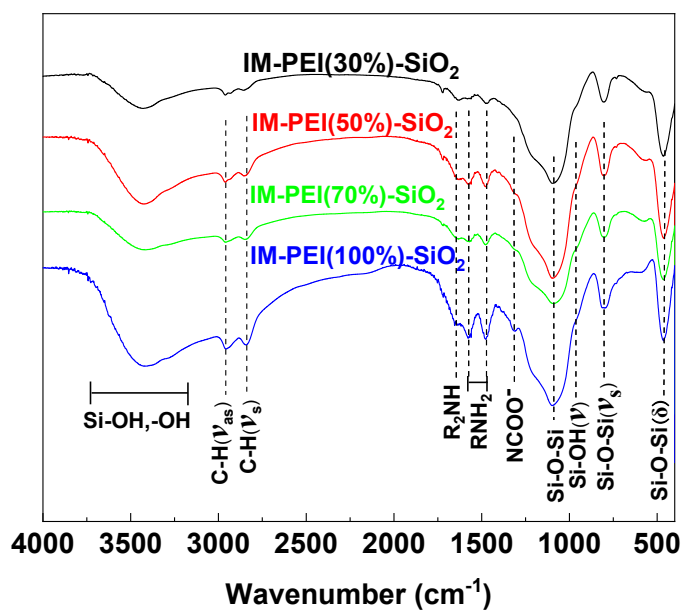


Figure S2. FTIR spectra of silica adsorbent prepared by impregnation method with different PEI loads.

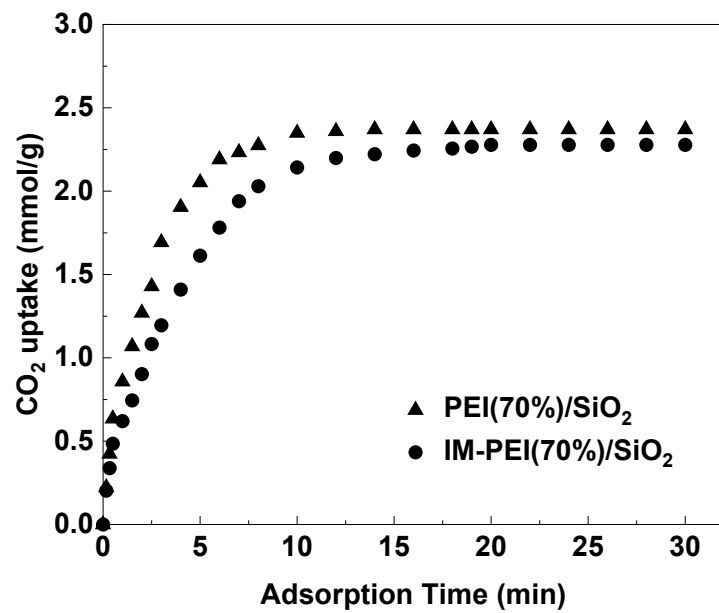


Figure S3. CO₂ adsorption kinetics curves of PEI(70%)/SiO₂ and IM-PEI(70%)/SiO₂.

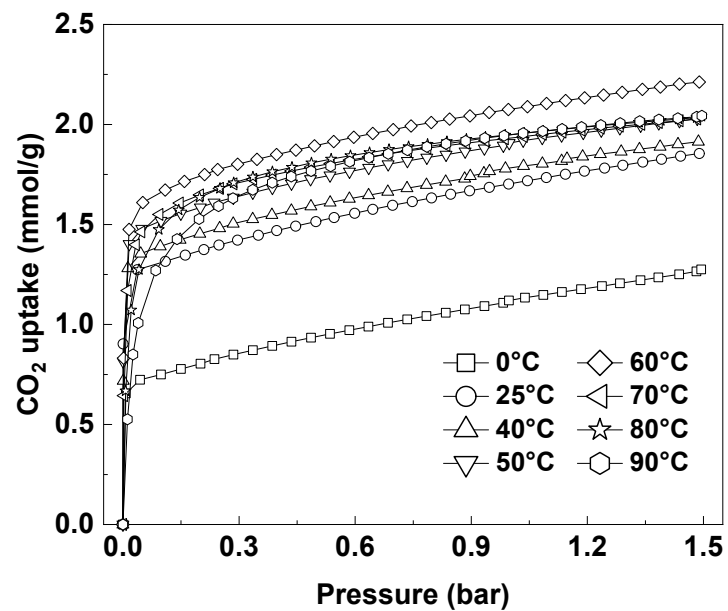


Figure S4. CO₂ absorption isotherms of IM-PEI(70%)/SiO₂ at different temperatures.

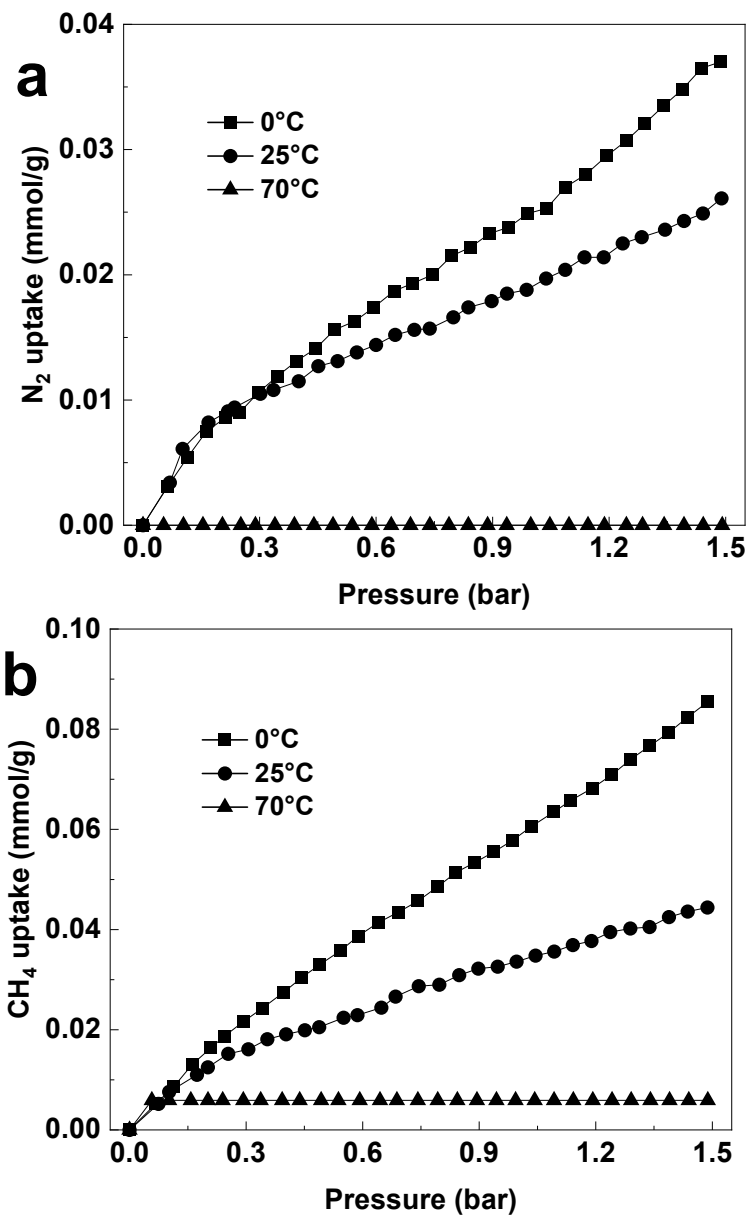


Figure S5. (a) N₂ and (b) CH₄ absorption isotherms of PEI(70%)/SiO₂ at 0°C, 25°C and 70°C.