

## Supplementary Information

### **Interaction between CO<sub>2</sub> and Ionic Liquids Confined in the Nanopores of SAPO-11**

Benqun Yang,<sup>a, b</sup> Feng Zhou,<sup>a</sup> Shimin Liu,<sup>a</sup> Peixue Wang,<sup>a</sup> Ahmad S. Alshammari<sup>c</sup>, and Youquan Deng<sup>\*, a</sup>

<sup>a</sup> Centre for Green Chemistry and Catalysis, State Key Laboratory of Solid Lubrication, Lanzhou Institute of Chemical Physics, Chinese Academy of Sciences, Lanzhou 730000, China,

<sup>b</sup> University of Chinese Academy of Sciences, Beijing, 100049, China

<sup>c</sup> National Nanotechnology Research Center, King Abdulaziz City for Science and Technology, P.O. Box 6086, Riyadh 11442, Saudi Arabia

\*Email: [ydeng@licp.cas.cn](mailto:ydeng@licp.cas.cn)

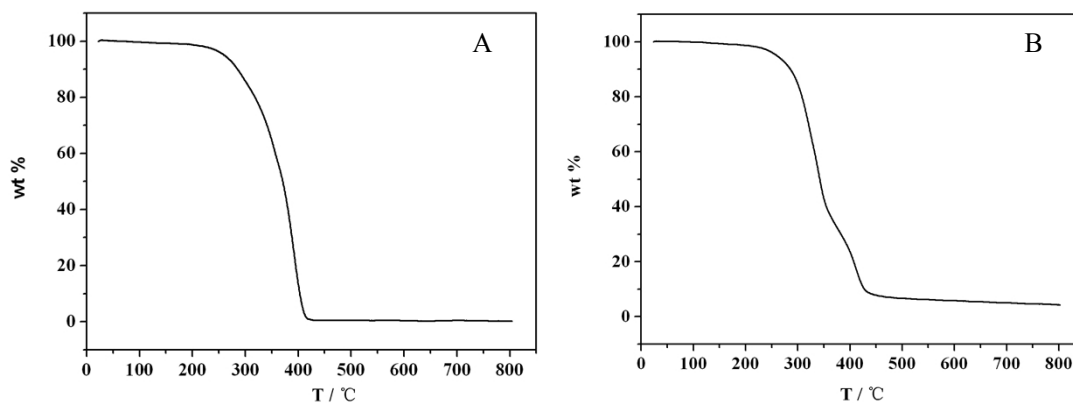


Fig .S1 (A) TGA traces of  $P_{4,4,4,6}Triz$ ; (B) TGA traces of  $P_{4,4,4,6}Atriz$ .

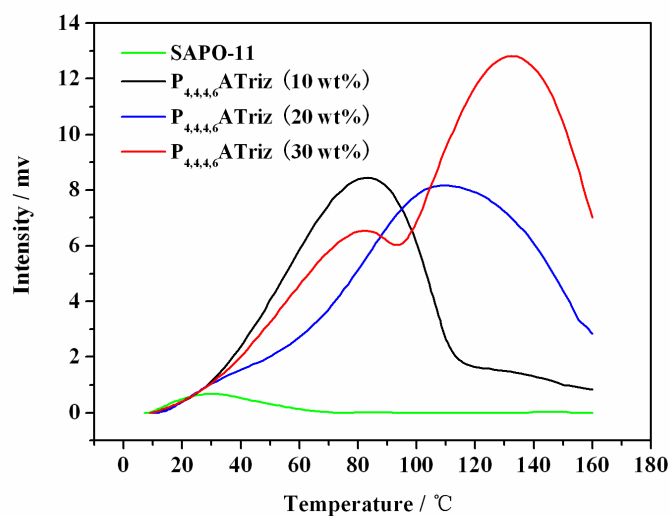


Fig .S2 TPD- $CO_2$  profiles of  $P_{4,4,4,6}Atriz$  confined in SAPO-11 at different loading values.

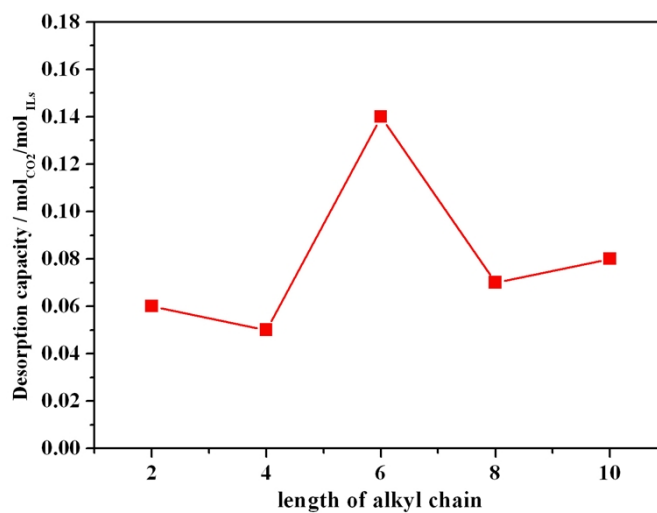
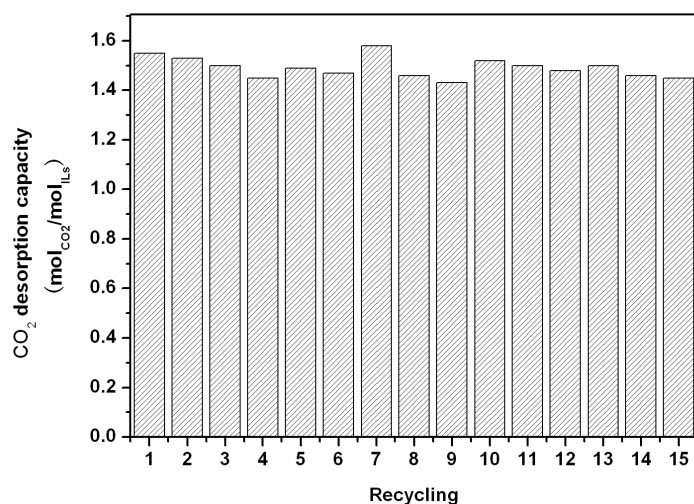


Fig .S3 Desorption capacity of different alkyl chain lengths of  $P_{4,4,4,n}BF_4/SAPO-11$  (30 wt%) (n=2, 4, 6, 8 and 10)



**Fig. S4** CO<sub>2</sub> desorption capacity of P<sub>4,4,4,6</sub>ATriz/SAPO-11(modified with Na<sub>2</sub>CO<sub>3</sub>, 30 wt%) for 15 cycles.

**Table S1.** CO<sub>2</sub> desorption of P<sub>4,4,4,6</sub>ATriz confined in SAPO-11 at different loading

Loadings of P <sub>4,4,4,6</sub> ATriz (wt%)	Desorption capacity/ mole <sub>CO<sub>2</sub></sub> /mole <sub>ILs</sub>	Maximum desorption temperature/°C	Complete desorption temperature/°C
10	1.32	83	---
20	1.17	109	---
30	0.97	82, 132	---

**Table S2.** CO<sub>2</sub> desorption of different alkyl chain lengths of P<sub>4,4,4,n</sub>BF<sub>4</sub>/SAPO-11 (30 wt%)

ILs	Desorption capacity/ mole <sub>CO<sub>2</sub></sub> /mole <sub>ILs</sub>	Maximum desorption temperature/°C	Complete desorption temperature/°C
P <sub>4,4,4,2</sub> BF <sub>4</sub>	0.06	78	110
P <sub>4,4,4,4</sub> BF <sub>4</sub>	0.05	49	76
P <sub>4,4,4,6</sub> BF <sub>4</sub>	0.14	77	110
P <sub>4,4,4,8</sub> BF <sub>4</sub>	0.07	72	103
P <sub>4,4,4,10</sub> BF <sub>4</sub>	0.08	64	105

**Table S3.** CO<sub>2</sub> desorption of ILs with different anions of P<sub>4,4,4,6</sub>X/SAPO-11 (30 wt%) (X = BF<sub>4</sub>, Br, PF<sub>6</sub> and TFSI)

ILs	Desorption capacity/ mole <sub>CO<sub>2</sub></sub> /mole <sub>ILs</sub>	Maximum desorption temperature/°C	Complete desorption temperature/°C
P <sub>4,4,4,6</sub> BF <sub>4</sub>	0.14	77	110
P <sub>4,4,4,6</sub> PF <sub>6</sub>	0.12	67	97
P <sub>4,4,4,6</sub> TFSI	0.11	50	87
P <sub>4,4,4,6</sub> Br	0.08	58	91