

## Supplementary Information

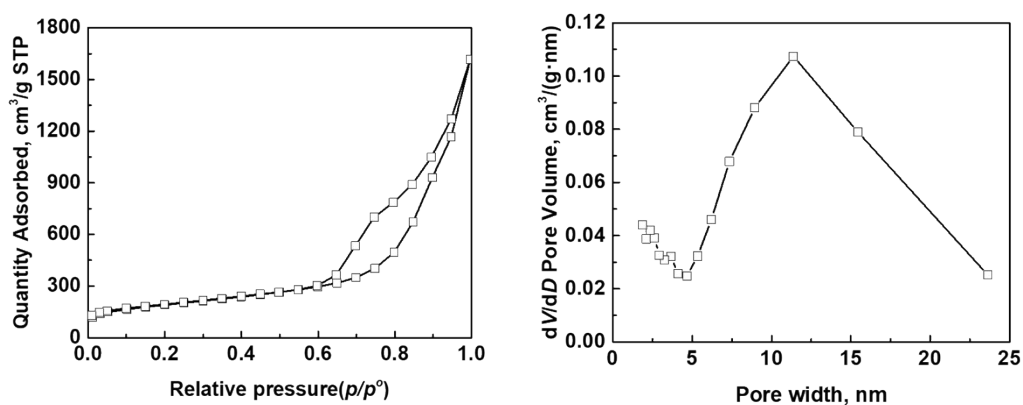
### The effect of nanoscale friction of mesoporous carbon supported ionic liquids on the mass transfer of CO<sub>2</sub> adsorption

Pengpeng Fan,<sup>a</sup> Xiuhua Qiu,<sup>a</sup> Faiz Ullah Shah,<sup>b</sup> Qingmin Ji<sup>a</sup> and Rong An<sup>\*ac</sup>

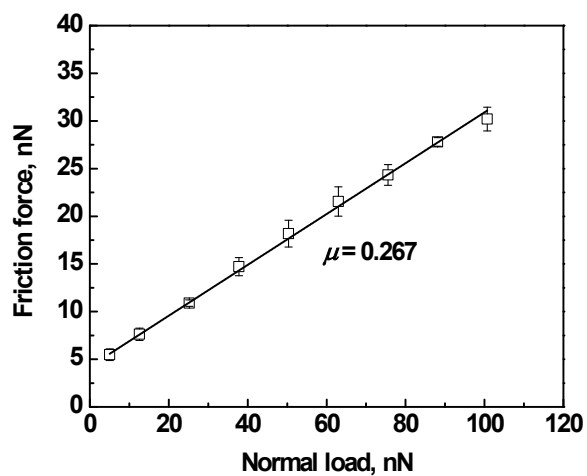
<sup>a</sup> Herbert Gleiter Institute of Nanoscience, Department of Materials Science and Engineering, Nanjing University of Science and Technology, Nanjing 210094, P.R. China

<sup>b</sup> Chemistry of Interfaces, Luleå University of Technology, 97187 Luleå, Sweden

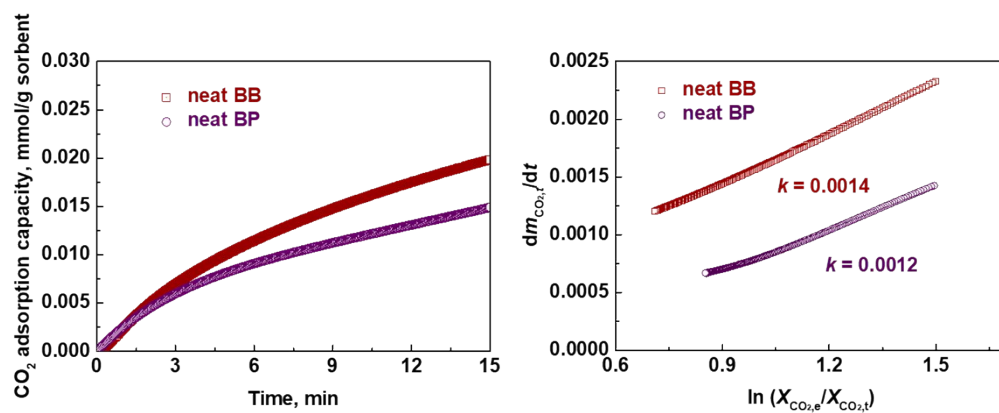
<sup>c</sup> Center for Nanotechnology (CeNTech), Institute of Physics, Westfälische Wilhelms-Universität Münster, 48149 Münster, Germany



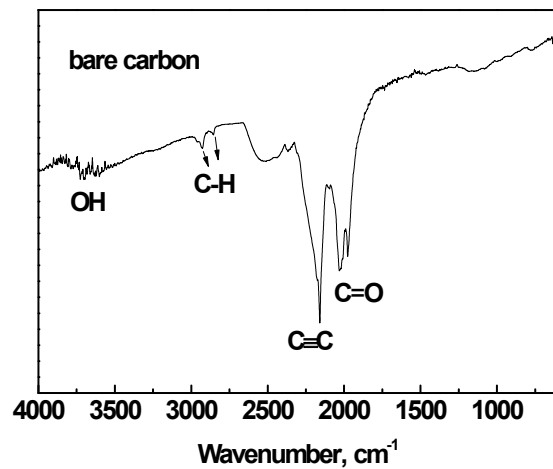
**Fig. S1** N<sub>2</sub> adsorption-desorption (BET isotherm) and BJH pore size distribution of the bare mesoporous carbon membrane.



**Fig. S2** Friction force vs applied normal load for the bare mesoporous carbon membrane using silicon nitride AFM tip.



**Fig. S3** CO<sub>2</sub> adsorption isotherms and  $dm_{CO_2,t}/dt$  vs  $\ln(X_{CO_2,e}/X_{CO_2,t})$  of the neat bulk BB and BP. The slope  $k$  is the mass transfer coefficient.



**Fig. S4** FTIR spectrum of the bare mesoporous carbon.