Electronic Supplementary Information (ESI) for Chemical Communications

Highly Efficient Reversible Adsorption of NO_2 in Imidazole Sulfonate Room Temperature Ionic Liquids

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Materials and General Methods

The imidazole sulfonate room temperature ionic liquids including 1-ethyl-3-methylimidazolium trifluoromethanesulfonate ([EMIM]OTF), 1-butyl-3-methylimidazolium trifluoromethanesulfonate ([BMIM]OTF), and 1-hexyl-3-methylimidazolium trifleoromethanesulfonate ([HMIM]O-TF) were purcased from Shanghai Cheng Jie Chemical Co. Ltd. (China), with the purity of above 99% and dried under vacumm at 70 °C for 24 h to remove possible traces of water prior to use; The NO_2 with the purity of above 99.5% was purcased from Nanjing Tong Guang Special Gas Co. Ltd. (China). The UV-vis spectra were recorded on a UV-3600 UV-Vis-NIR Spectrometer (Shimadzu, Japan). The FTIR spectra were recorded on a Nicolet iS10 instrument (Nicolet, USA). The photographs were taken with a DSC-TX100 camera (Sony, Japan). The absorption facilities were purcased from Jiangsu

Haian Petroleum Scientific Instrument Co. Ltd. (China). The pressure data were recorded with a WIDEPLUS-8 pressure sensor purcased from Fujian Shangrun Precision Instrument Co. Ltd. (China). The temperature was controlled by a CKW-1 heating instrument purcased from Nanjing Chaoyang Instruments Co. Ltd. (China).

Adsorption and Desorption of NO_2

By absorbing NO_2, two kettles were connected together with a valve and immersed in a water bath of desirable temperature. A vacuum pump was connected to the kettles to control the pressure of the system, and a pressure sensor with the accuracy of 0.001 MPa was used to show and record the pressure data during the adsorption-desorption processes. NO_2 was released to the surface of ILs contained in a glass container with an inner diameter of 2.5 cm, and the initial pressure was recorded by the pressure sensor. With the help of magnetic stirring, the NO_2 was automatically absorbed by the ILs and the pressure changes were recorded. After the aborbing equlibrium was achieved, the connected kettles were evacuated so that the NO_2 could be released rapidly. Then the next round of absorption-desorption was conducted by using the same method.

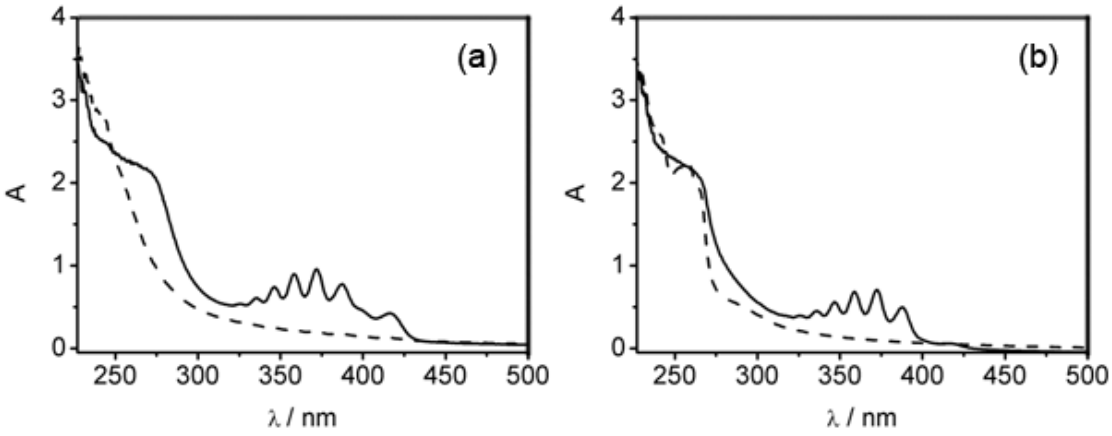

Fig. S1 UV-vis spectra of [Emim]OTF (a) and [Bmim]OTf (b), before (dashed lines) and after (solid lines) absorption of NO_2.

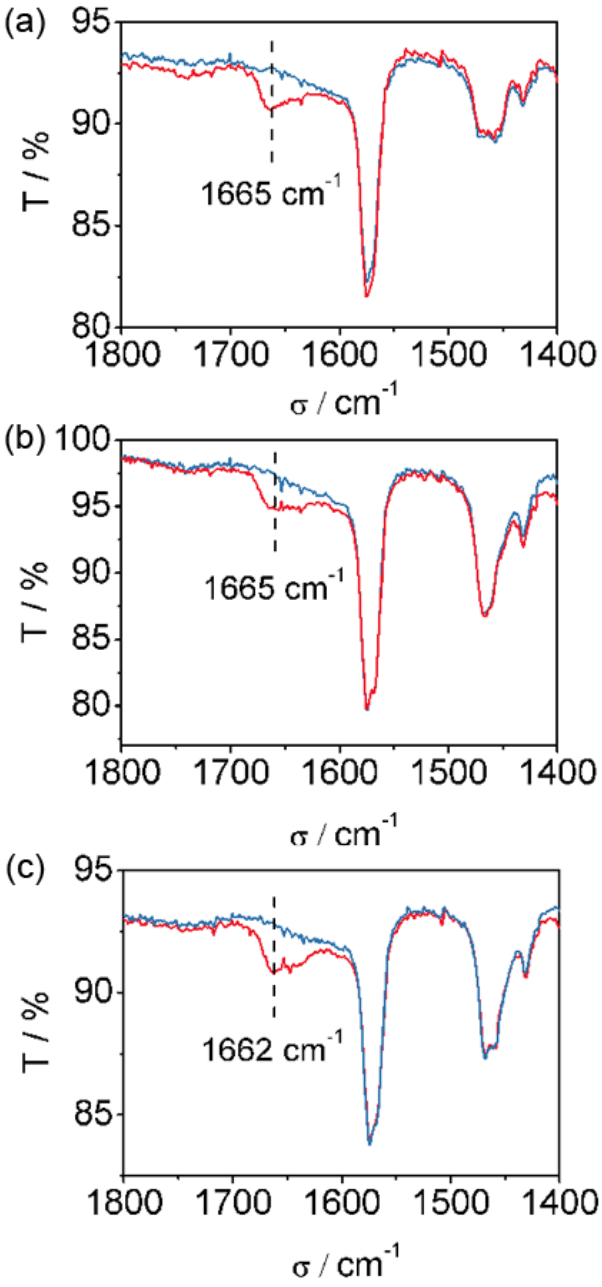

Fig. S2 FTIR spectra of [Emim]OTf (a), [Bmim]OTf (b), and [Hmim]OTf, before (blue lines) and after (red lines) absorption of NO_2

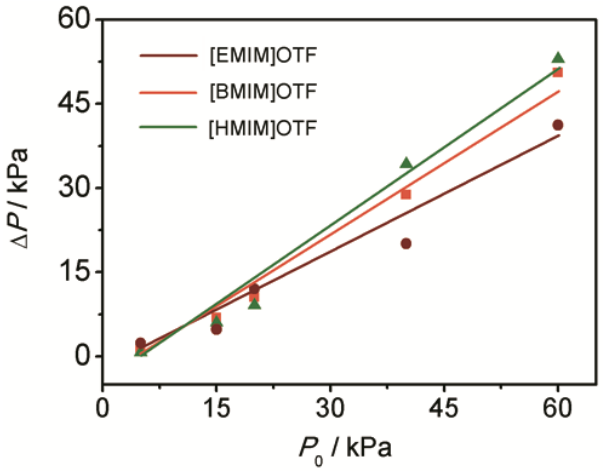

Fig. S3 The relationship between the pressure changes during the absorption of NO_2 in different ILs (left corner) and the initial pressures of NO_2(P_0)

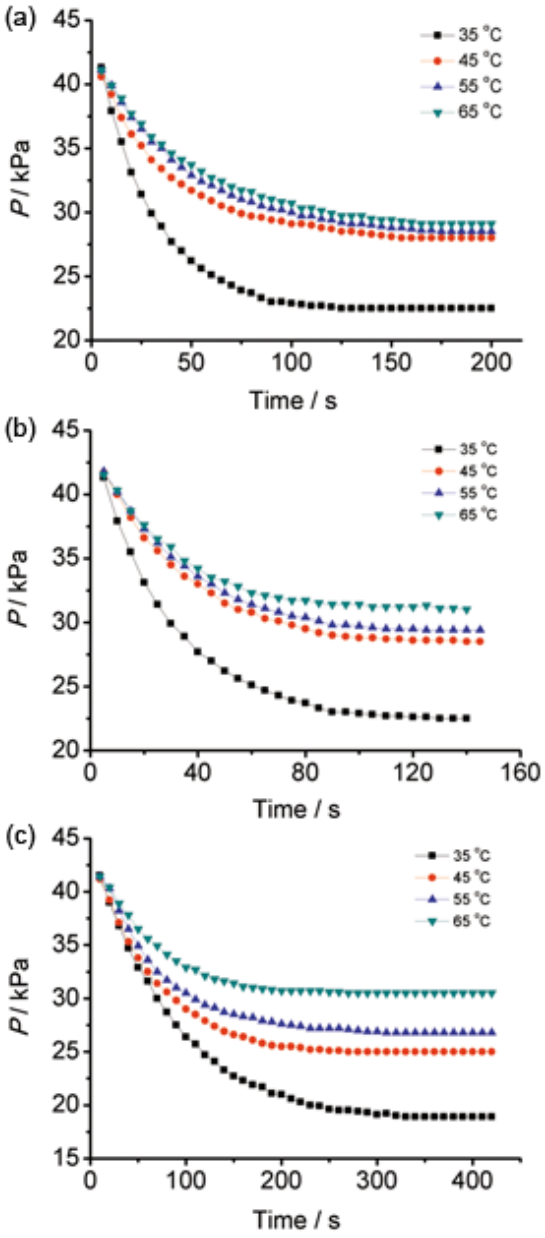

Fig. S4 The real-time system pressures (P) during the absorption of NO_2 in [Emim]OTf (a), [Bmim]OTf (b), and [Hmim]OTf, at the different temperatures (right corners).