

Supporting Information for

Graphene Oxide Immobilized with Ionic Liquids: One-step Synthesis and Efficient Catalysis for Solvent-free Cycloaddition of CO₂ to Propylene Carbonate

Jie Xu, Mang Xu, Jing Wu, Hao Wu, Wei-Hong Zhang, Yong-Xin Li *

*Jiangsu Key Laboratory of Advanced Catalytic Materials and Technology, School of
Petrochemical Engineering, Changzhou University, Gehu Road 1, Changzhou,
Jiangsu 213164, PR China*

Preparation of silanized GO material

0.1 g of dried GO and 1 g of trimethylchlorosilane were added into 50 mL of toluene. Afterwards, the mixture was ultrasonicated for three times; each ultrasonication lasted for ca. 30 min. After that, the dispersed mixture was refluxed for 5 h, and then filtrated, rinsed by toluene for several times, and subsequently dried overnight under 80 °C. The resultant silanized GO material was denoted as GO-sil.

Immobilization of ILs on silanized GO

0.1 g of GO-sil was added into 100 mL of ethanol containing 1.0 g of [SmIm]Cl. Next, the mixture was ultrasonicated for three times; each ultrasonication lasted for ca. 30 min. After that, the well dispersed mixture was refluxed for 24 h, and then filtrated, rinsed by ethanol for several times, and subsequently dried overnight under 80 °C. Finally, the obtained immobilized IL was denoted as GO-sil-[SmIm]Cl.

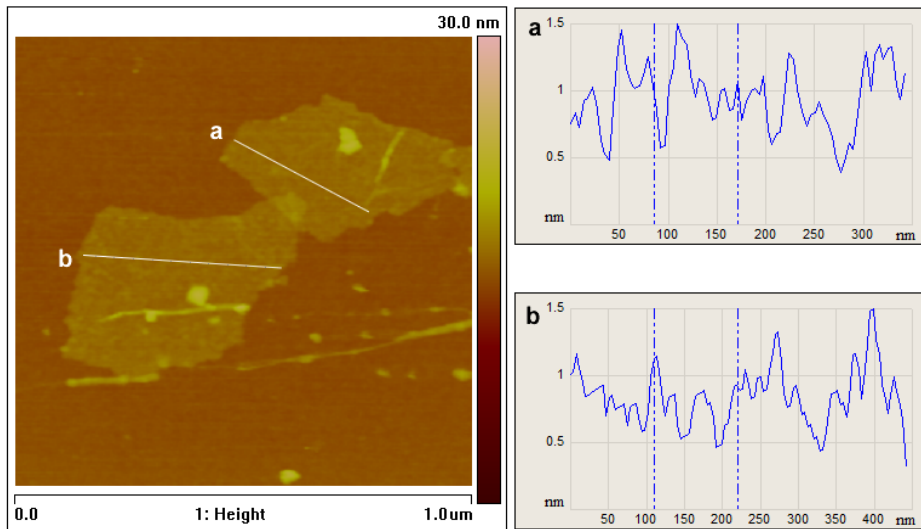


Fig. S1 AFM image (left) of GO material and its height profiles (right) along the two lines marked in the image.

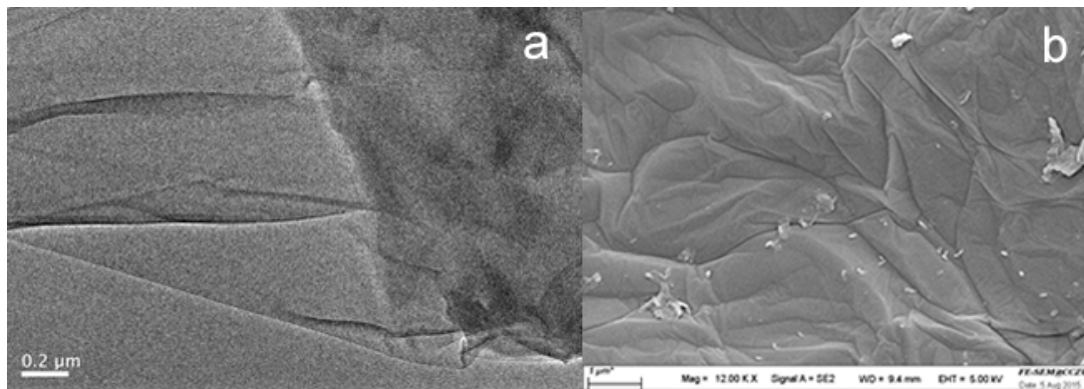


Fig. S2 TEM (a) and SEM (b) images of GO.

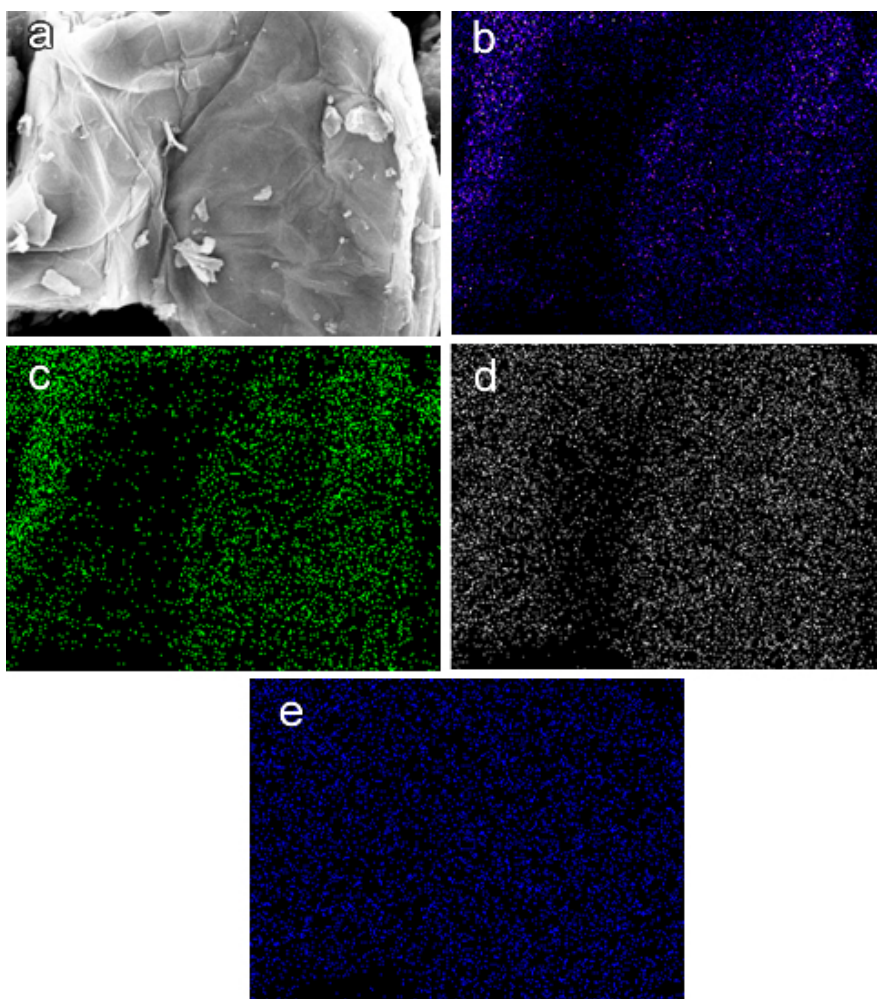


Fig. S3 SEM image (a) of GO-[SmIm]I and its corresponding EDX mapping images of C (b), O (c), Si (d), and I (e) elements.

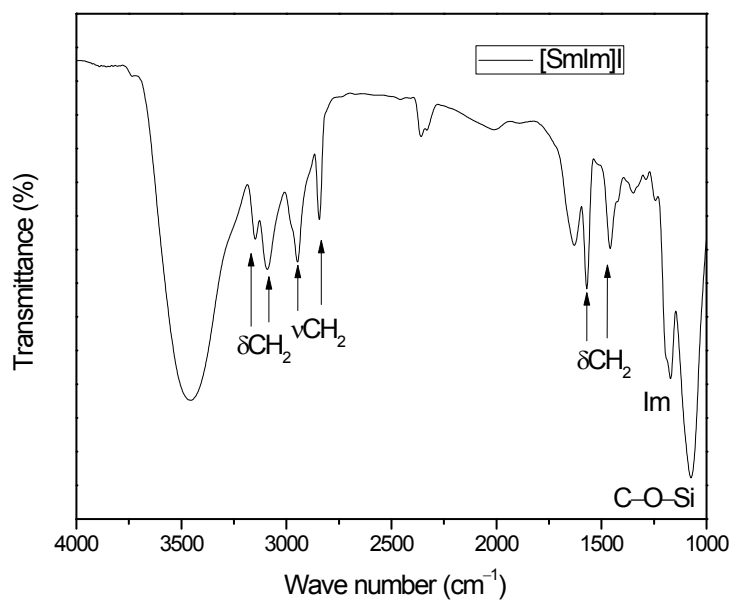


Fig. S4 FT-IR spectrum of [SmIm]I.

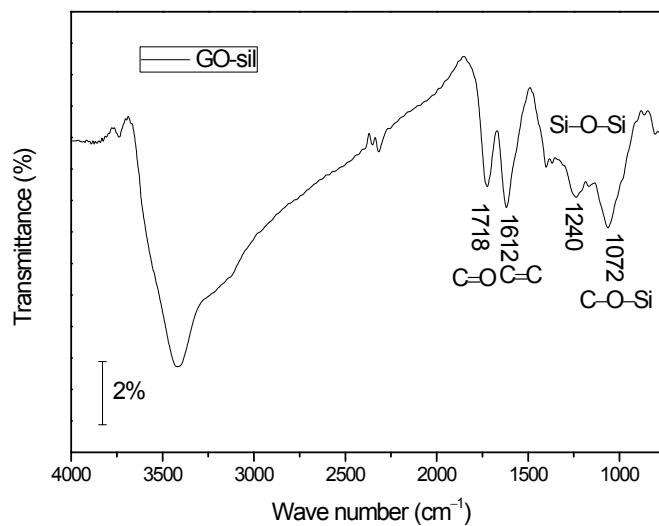


Fig. S5 FT-IR spectrum of GO-sil.

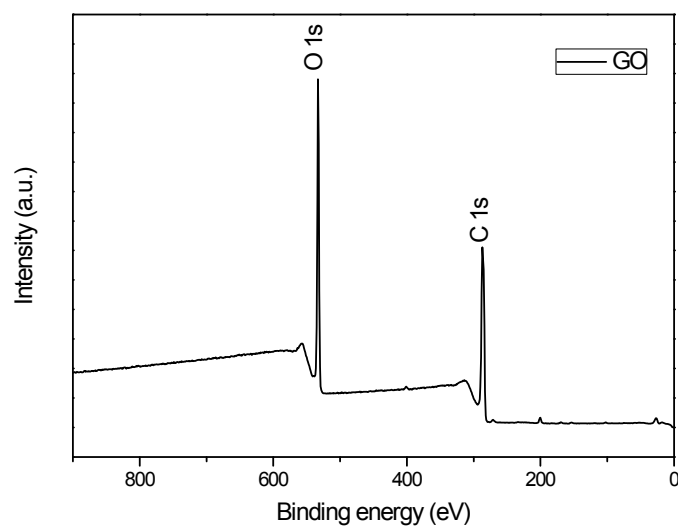


Fig. S6 XPS survey of the GO material.

Table S1 The classification of C species according to the C 1s spectra.

Binding energy (eV)	C species
284.7	graphitic C (sp ²)
285.4	C-OH
285.9	C-N
286.7	epoxy C
288.4	C=O

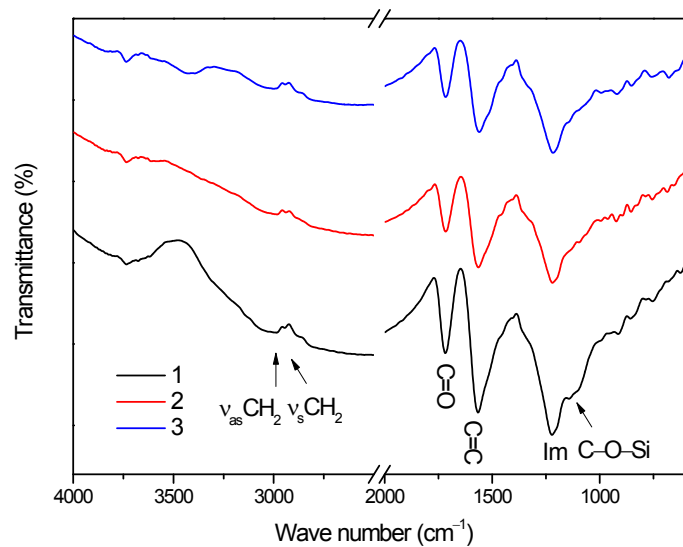


Fig. S7 FT-IR spectra of the spent GO-[SmIm]I catalysts subjected to one, two, and three catalytic runs.

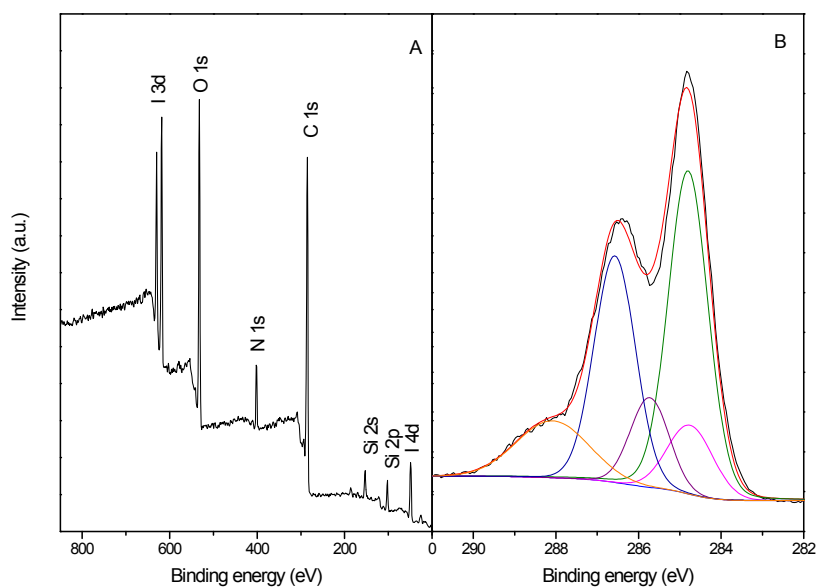
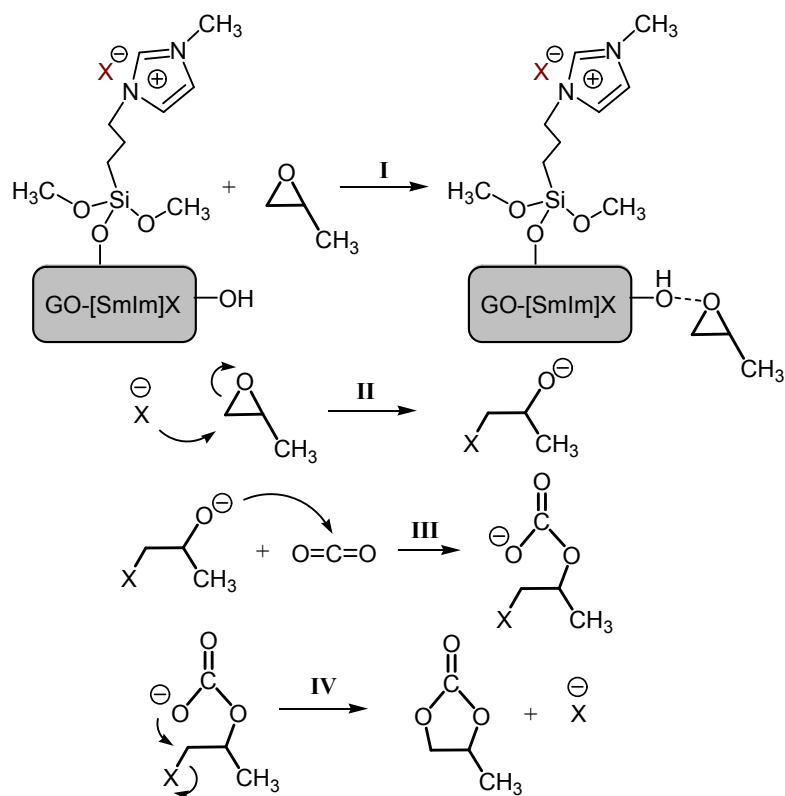


Fig. S8 XPS survey (A) and C 1s spectrum of the spent GO-[SmIm]I catalysts subjected to four catalytic runs.



Scheme S1 A possible reaction mechanism of the cycloaddition of CO₂ with PO to PC catalyzed by GO-[SmIm]X material.