

Ru nanoparticles stabilized by ionic liquids supported onto silica:

Highly active catalysts for low temperature CO₂ methanation

Xinpeng Guo^{a,b}, Zhijian Peng^a, Atsadang Traitangwong^b, Gang Wang^b, Haiyang Xu^b, Vissanu Meeyoo^b, Chunshan Li^{b*}, Suojiang Zhang^b

^a School of Engineering and Technology, China University of Geosciences, Beijing 100083, PR China

^b CAS Key Laboratory of Green Process and Engineering, State Key Laboratory of Multiphase Complex System, Beijing Key Laboratory of Ionic Liquids Clean Process, Institute of Process Engineering, Chinese Academy of Sciences, Beijing 100190, PR China.

* Corresponding author: ChunshanLi. TEL/FAX: +86-10-82544800; E-mail: csli@ipe.ac.cn

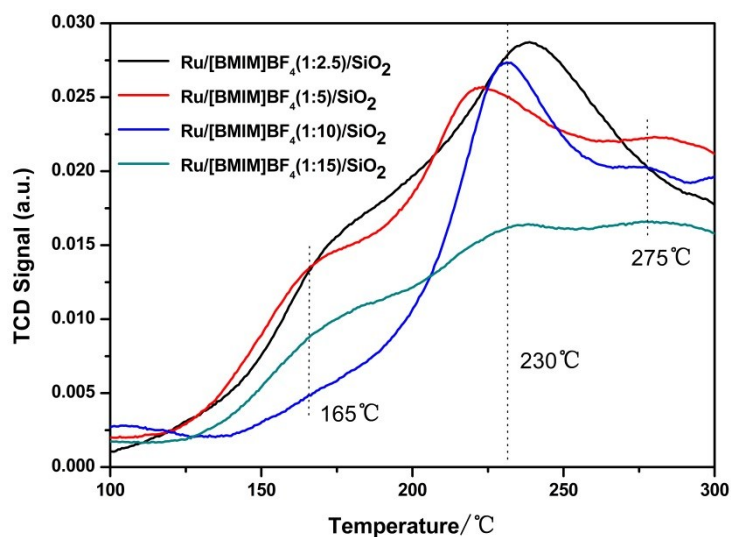


Fig. S1 CO₂-TPD profiles of the Ru based catalysts synthesized with different ratios of Ru/[BMIM]BF₄.

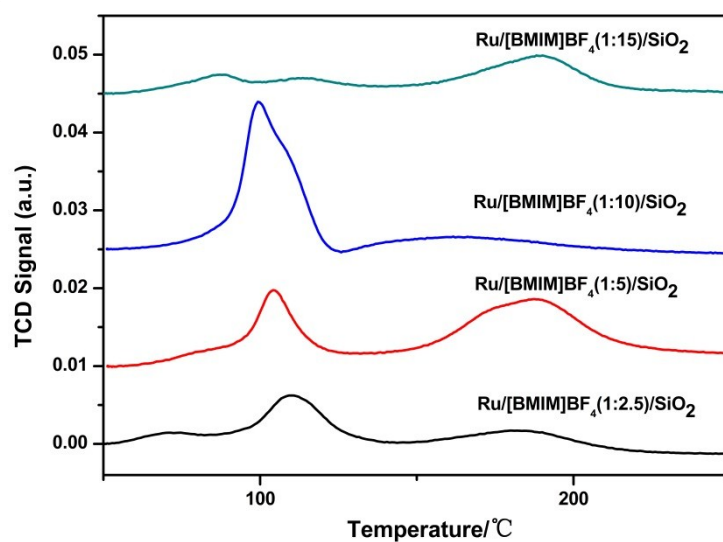


Fig. S2 H₂-TPR profiles of the Ru-based catalysts synthesized with different ratios of Ru/[BMIM]BF₄.

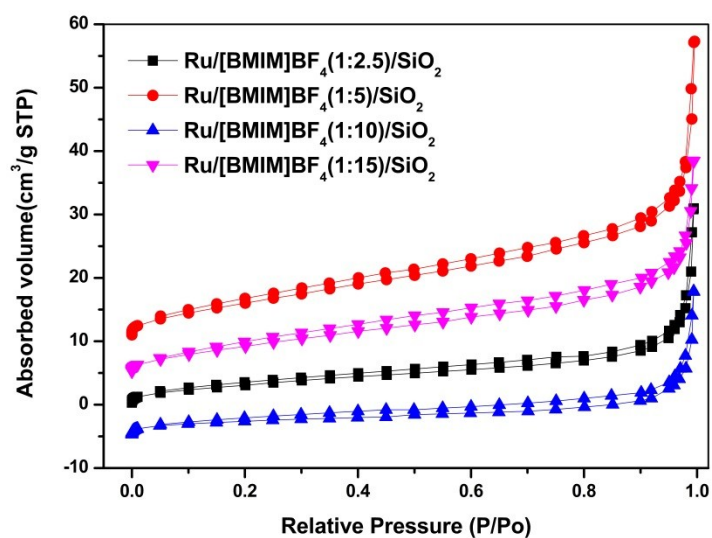


Fig. S3 N₂ adsorption-desorption isotherms of the Ru-based catalysts with different ratios of

Ru/[BMIM]BF₄.

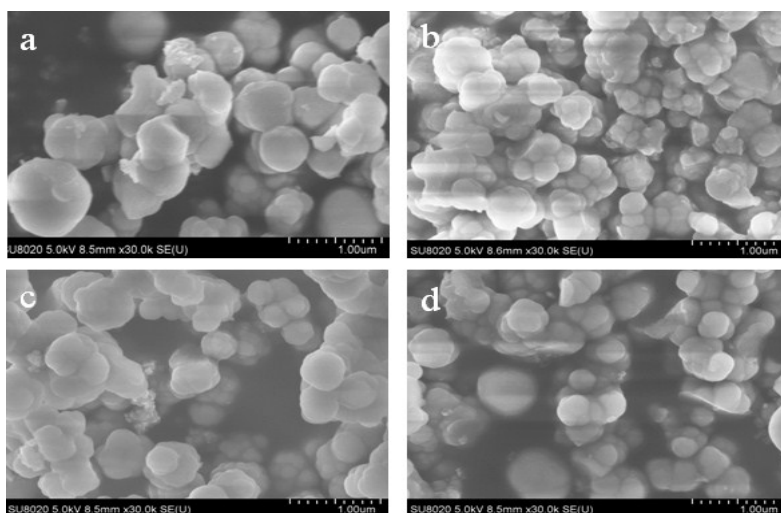


Fig. S4 SEM images of the Ru-based catalysts with different ratios of Ru/[BMIM]BF₄.

a) Ru/[BMIM]BF₄(1:2.5)/SiO₂, b) Ru/[BMIM]BF₄(1:5)/SiO₂, c) Ru/[BMIM]BF₄(1:10)/SiO₂, d) Ru/[BMIM]BF₄(1:15)/SiO₂

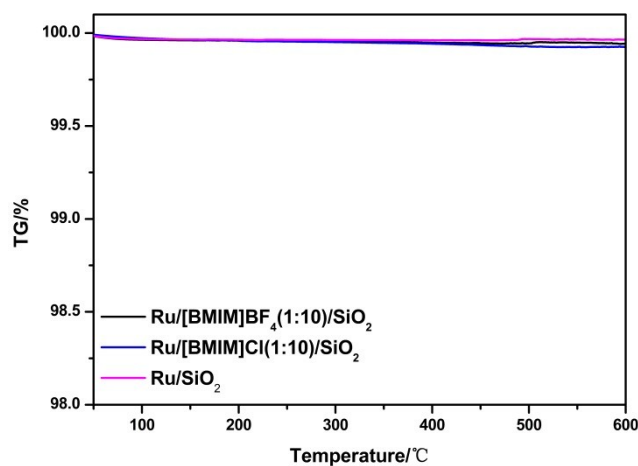


Fig. S5 TGA curves of the spent Ru based catalysts synthesized with different ionic liquids

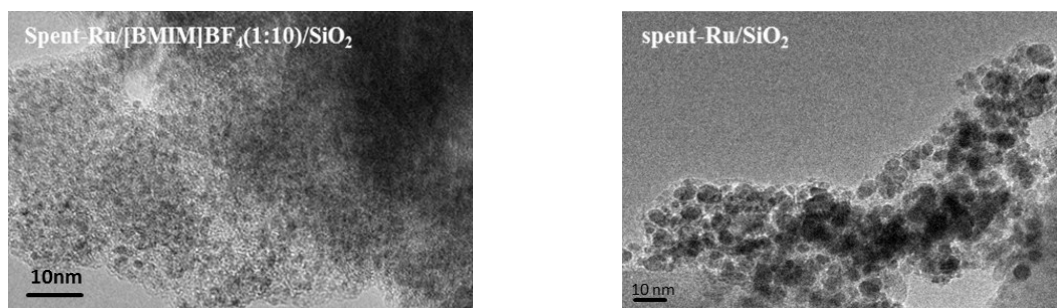


Fig. S6 TEM images of spent Ru/[BMIM]BF₄(1:10)/SiO₂ catalyst and Ru/SiO₂ catalyst.