

Supplementary Information

Highly Efficient Synthesis of Cyclic Ureas from CO₂ and Diamines by Pure CeO₂ Catalyst Using 2-Propanol Solvent

Masazumi Tamura,^a Kensuke Noro,^a Masayoshi Honda,^a Yoshinao Nakagawa,^a and Keiichi Tomishige^{a*}

^a Graduate School of Engineering, Tohoku University, Aoba 6-6-07, Aramaki, Aoba-ku, Sendai, 980-8579 (Japan)

*Corresponding author: e-mail: tomi@erec.che.tohoku.ac.jp

Tel.: +81-22-795-7214, fax.: +81-22-795-7214

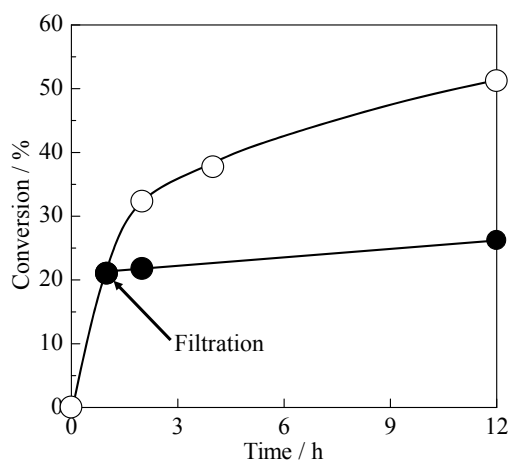


Fig. S1 Leaching test of the direct synthesis of **1** from CO₂ and ethylenediamine. Without removal of CeO₂ (○) and with removal of CeO₂ (●); an arrow indicates the removal of CeO₂ by filtration.

Reaction conditions: ethylenediamine (10 mmol), methanol (6.4 g), CeO₂ (0.085 g), P_{CO_2} = 0.5 MPa, T = 433 K.

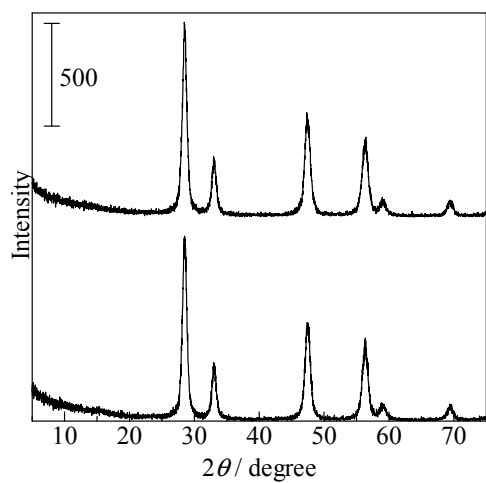


Fig. S2 XRD of (a) fresh CeO₂ and (b) CeO₂ used once.

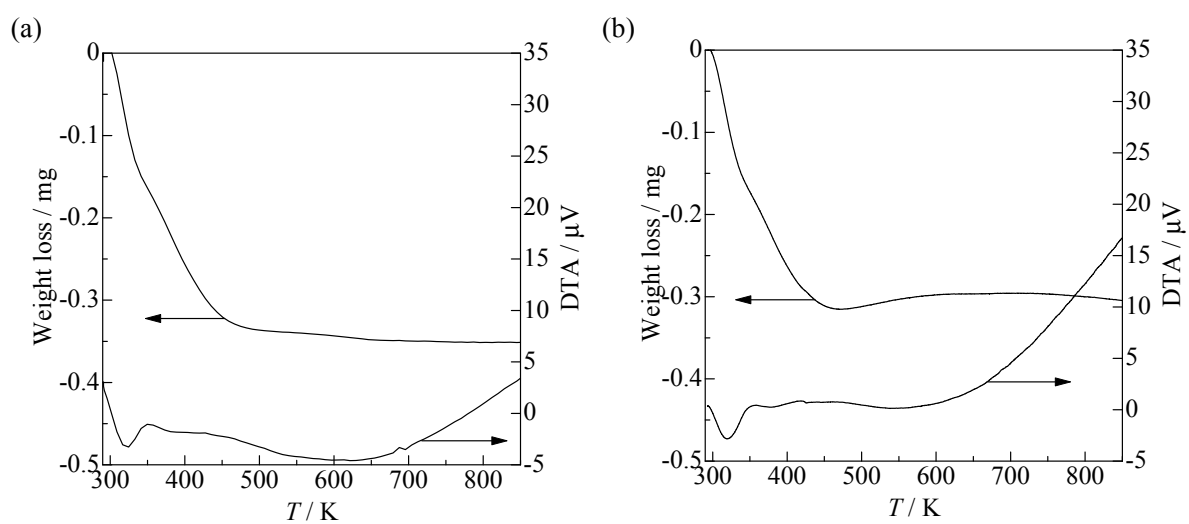


Fig. S3 TG-DTA profile of (a) fresh CeO₂ and (b) CeO₂ used once.

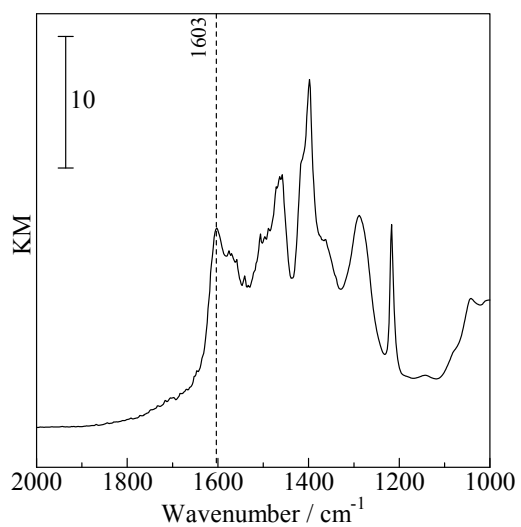


Fig. S4 FTIR spectrum of CO₂ adspecies on CeO₂ at 303 K.

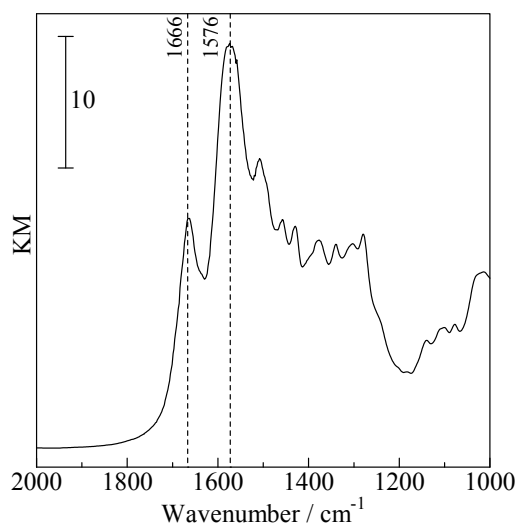


Fig. S5 FTIR spectrum of adspecies of **1** on CeO₂ at 423 K.