Cu-Mg-Zr/SiO_2 Catalyst for Selective Hydrogenation of Ethylene Carbonate to Methanol and Ethylene Glycol

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Supporting Information

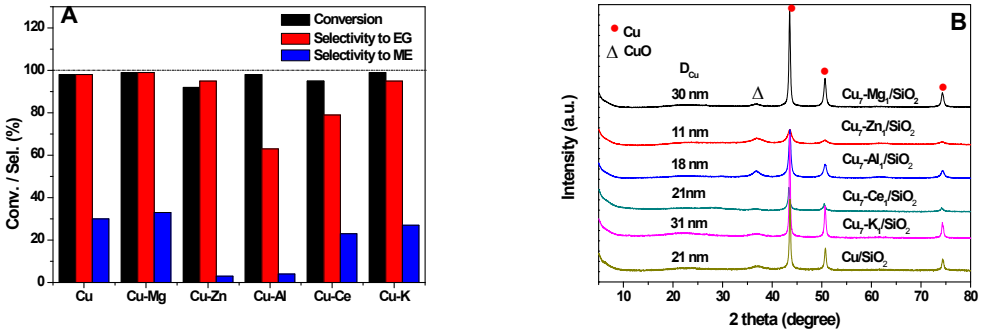

Fig. S1. (A) The conversion of EC, the selectivity to EG and ME with various supported Cu catalysts. Reaction conditions: 1 g of the as-calcined Cu/SiO_2 or Cu_7-M_1/SiO_2 catalyst precursor *in situ* reduced at 350 °C in 2.0 MPa H_2; Reaction temp. = 180 °C, H_2= 60 ml/min, $GHSV_{H2}$=2400, $WHSV_{EC}$ = 0.13, 2.0 MPa of H_2. (B) The XRD patterns of the Cu_7-M_1/SiO_2 catalysts.

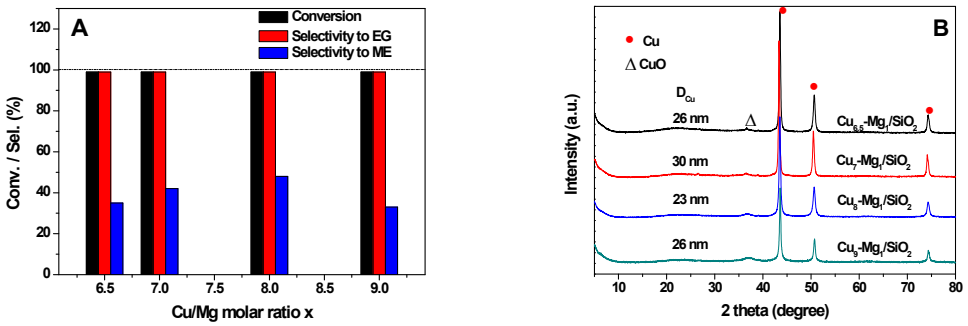

Fig. S2. (A) The conversion of EC, the selectivity to EG and ME with Cu_x-Mg_1/SiO_2 catalysts. Reaction conditions: the reaction conditions are identical with those for Fig. S1 except that 3 MPa of H_2 was adopted. (B) The XRD patterns of the Cu_x-Mg_1/SiO_2 catalysts.

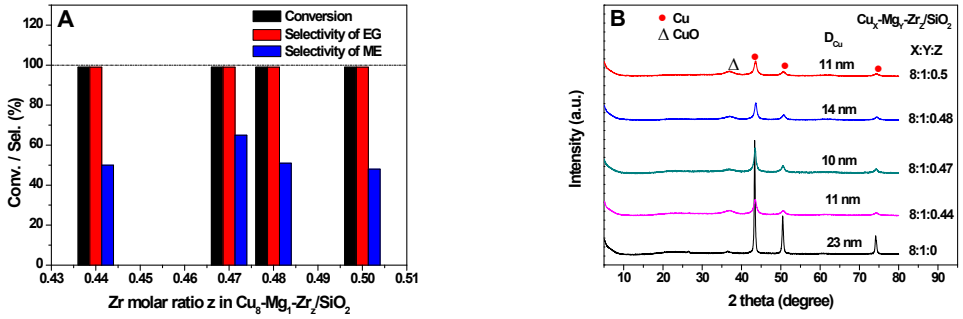

Fig. S3. (A) The conversion of EC, the selectivity to EG and ME with Cu_8-Mg_1-Zr_z/SiO_2 catalysts, the reaction conditions are identical with those for Fig. S2. (B) The XRD patterns of the Cu_8-Mg_1-Zr_z/SiO_2 catalysts.

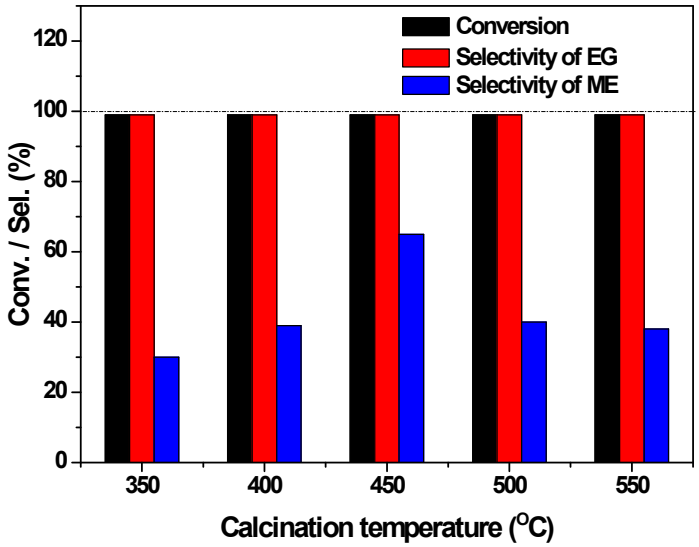

Fig. S4. The conversion of EC, the selectivity to EG and ME versus Cu_8-Mg_1-$Zr_{0.47}/SiO_2$ catalyst precursor calcination temperature. The reaction parameters are identical with those for Fig. S2 except that the catalyst precursor was calcined at different temperatures.

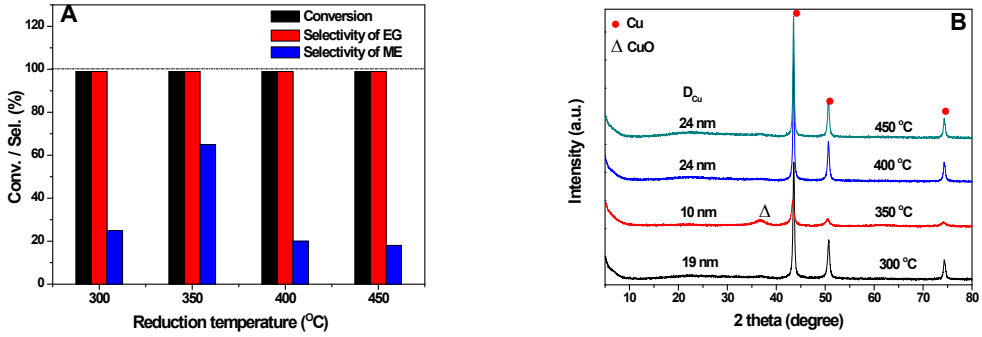

Fig. S5. (A) The conversion of EC, the selectivity to EG and ME versus Cu_8-Mg_1-$Zr_{0.47}/SiO_2$ catalyst reduction temperature. The reaction parameters are identical with those for Fig. S2 except that the catalyst precursor was reduced at different temperatures. (B) XRD patterns of Cu_8-Mg_1-$Zr_{0.47}/SiO_2$ catalysts after reduced at different temperatures.

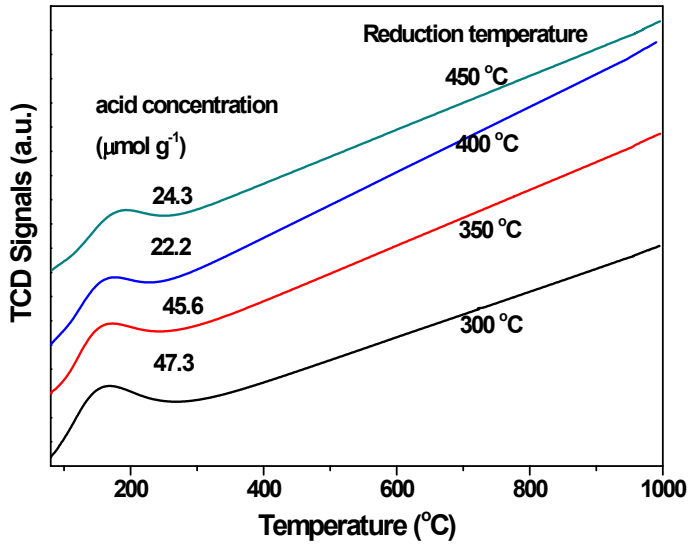

Fig. S6. NH_3-TPD curves of Cu_8-Mg_1-$Zr_{0.47}/SiO_2$ catalyst after reduced at different temperatures.

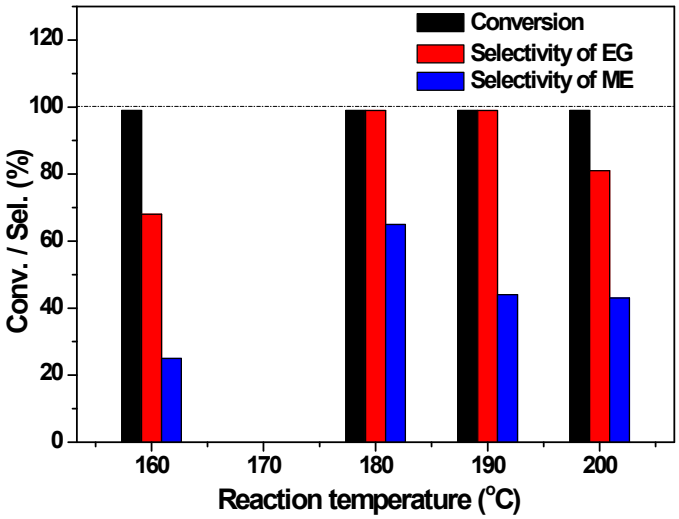

Fig. S7. The conversion of EC, the selectivity to EG and ME versus reaction temperature with Cu_8-Mg_1-$Zr_{0.47}/SiO_2$ catalyst. The reaction parameters are identical with those for Fig. S2 except that the reaction was conducted at different temperatures.

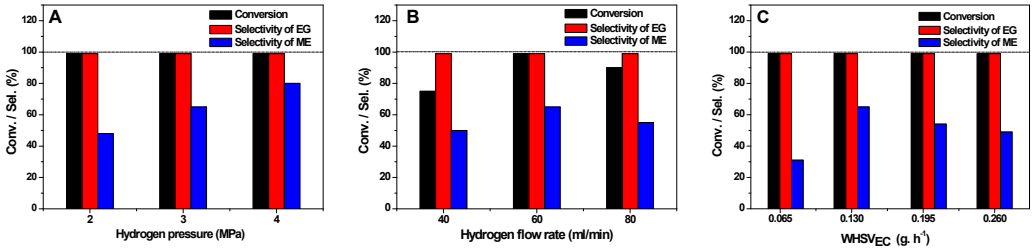

Fig. S8. (A) The conversion of EC, the selectivity to EG and ME versus hydrogen pressure; (B) effect of hydrogen flow rate on the conversion of EC, the selectivity to ME and EG; (C) The conversion of EC, the selectivity to ME and EG versus $WHSV_{EC}$. Other reaction parameters are identical with those for Fig. S2.