Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

Lanthanum nanocluster/ZIF-8 for boosting catalytic CO_2/glycerol conversion using $MgCO_3$ as a dehydrating agent

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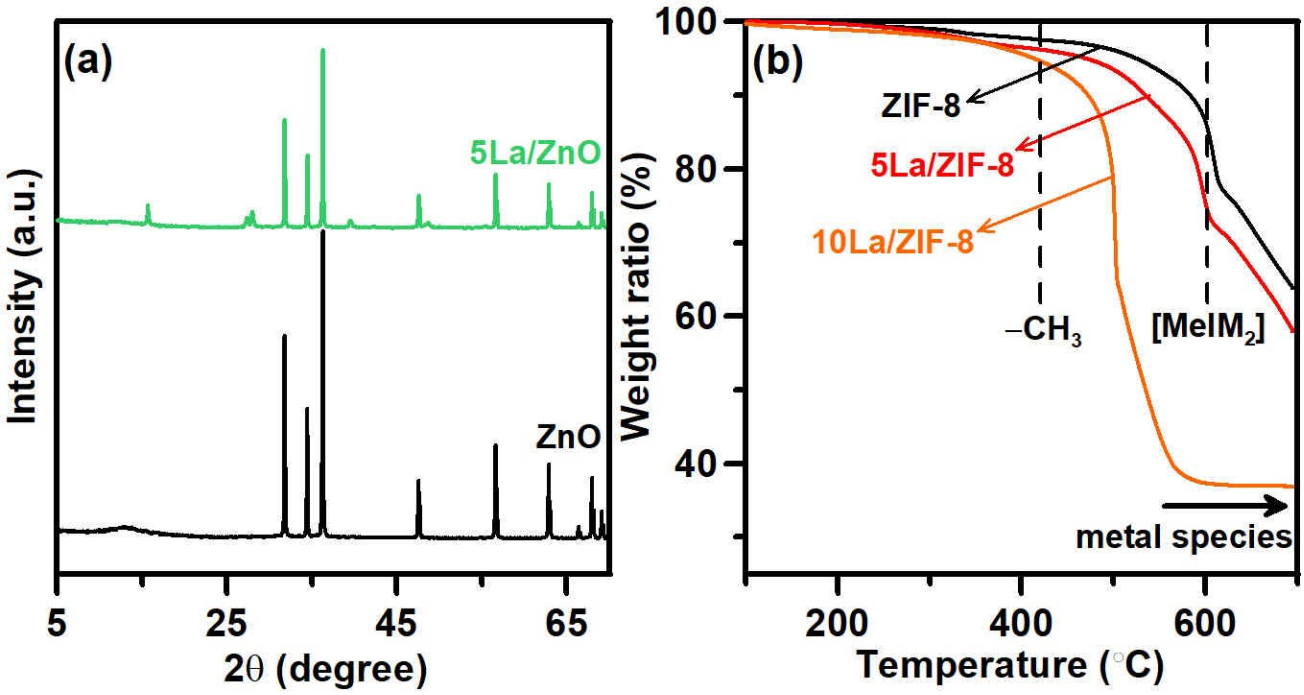

Figure S1 (a) XRD patterns of ZnO and 5La/ZnO, (b) TGA plot of ZIF-8, 5La/ZIF-8, and 10La/ZIF-8 measured at 100–750 °C with a heating rate of 10 °C min^{-1} under continuous air purging.

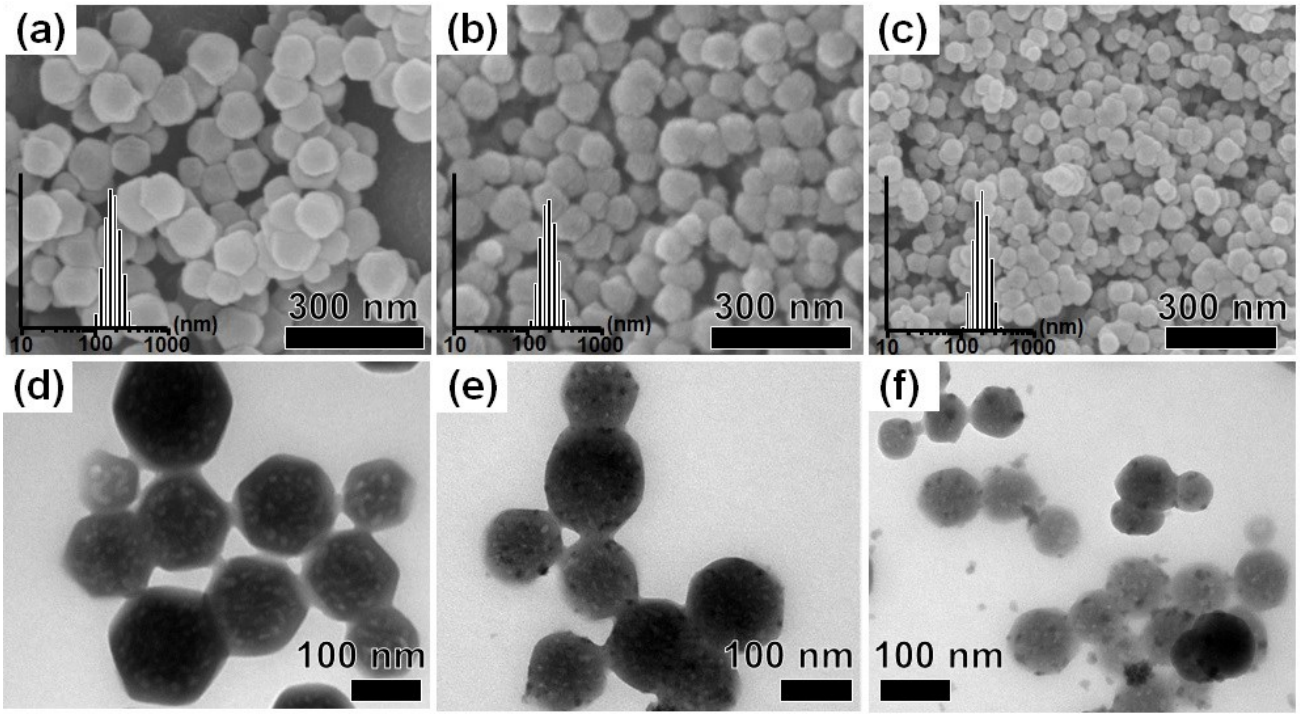

Figure S2 (a–c) SEM and (d–e) TEM images of ZIF-8, 5La/ZIF-8, and 10La/ZIF-8. Insets of (a–c) indicated the particle size distribution as obtained from DLS analysis.

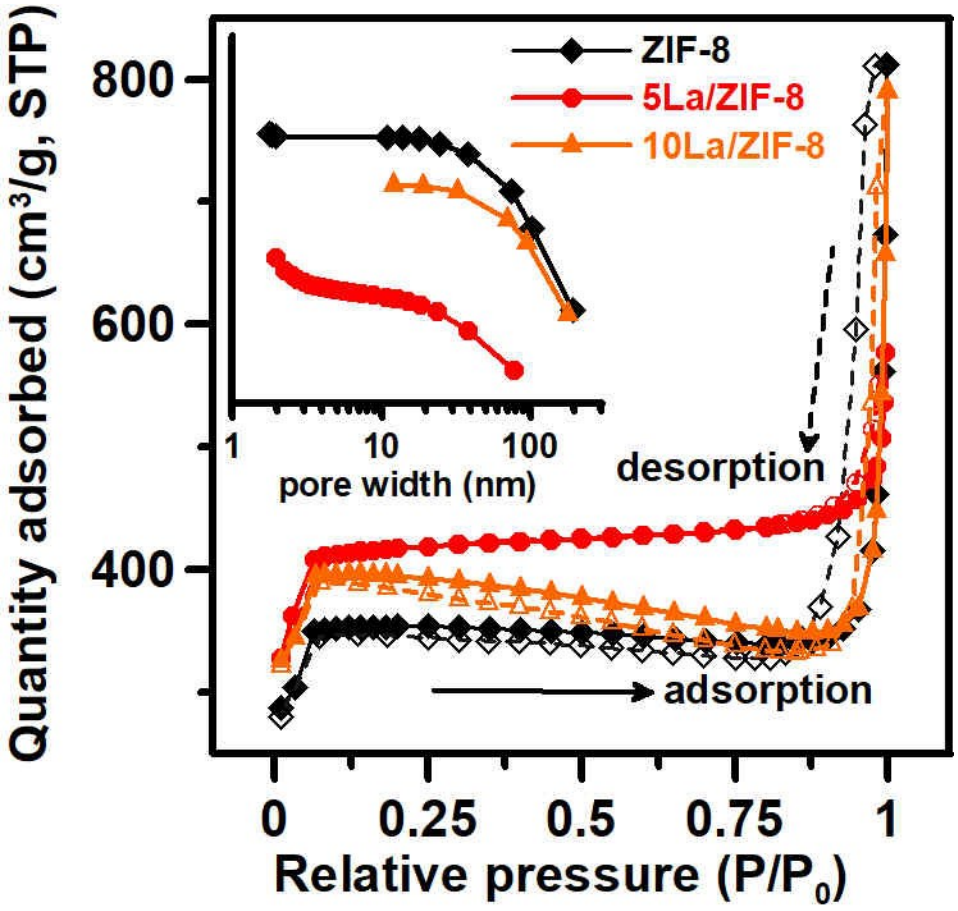

Figure S3 N_2 adsorption-desorption isotherm of ZIF-8, 5La/ZIF-8, and 10La/ZIF-8 samples. The inset shows the BJH (Barrett, Joyner, and Halenda) pore distribution of these samples.

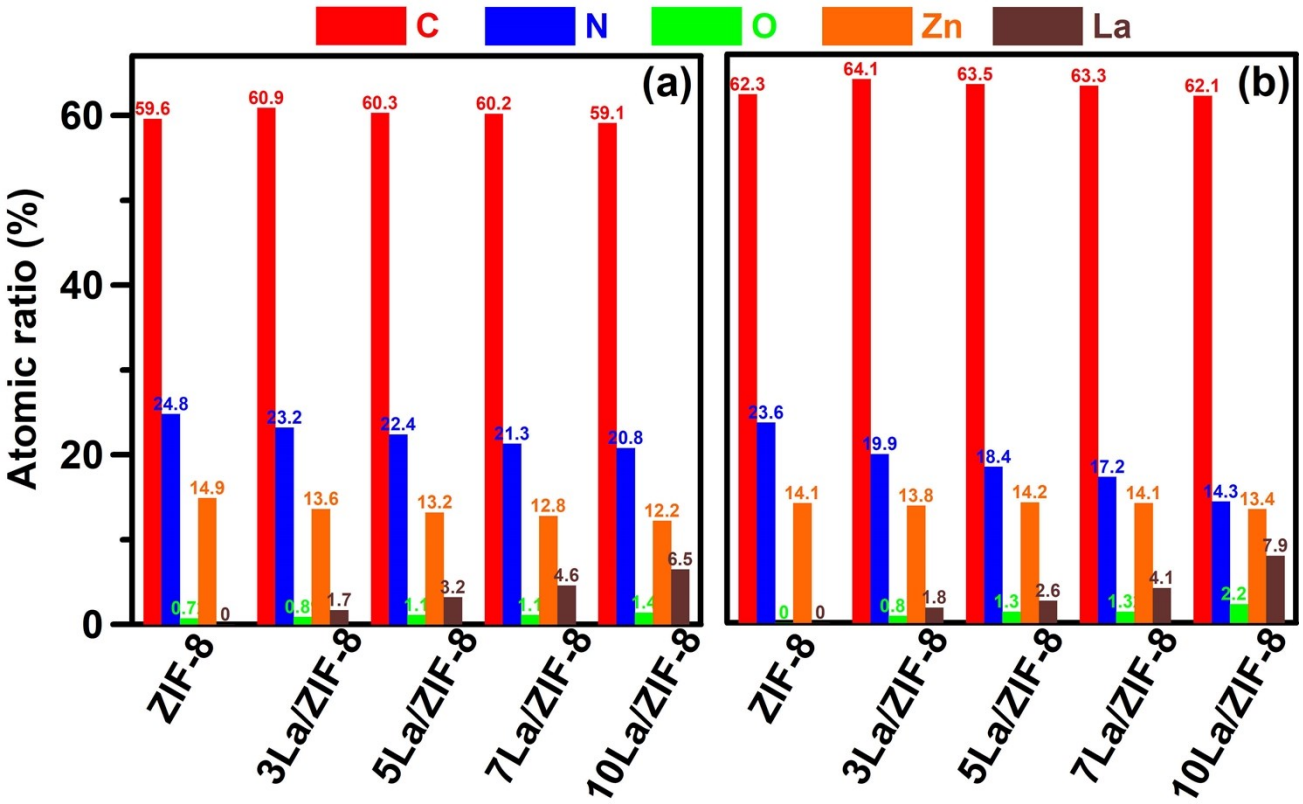

Figure S4 Elemental analyses of ZIF-8 and La/ZIF-8 samples obtained using (a) XPS and (b) SEM-EDS.

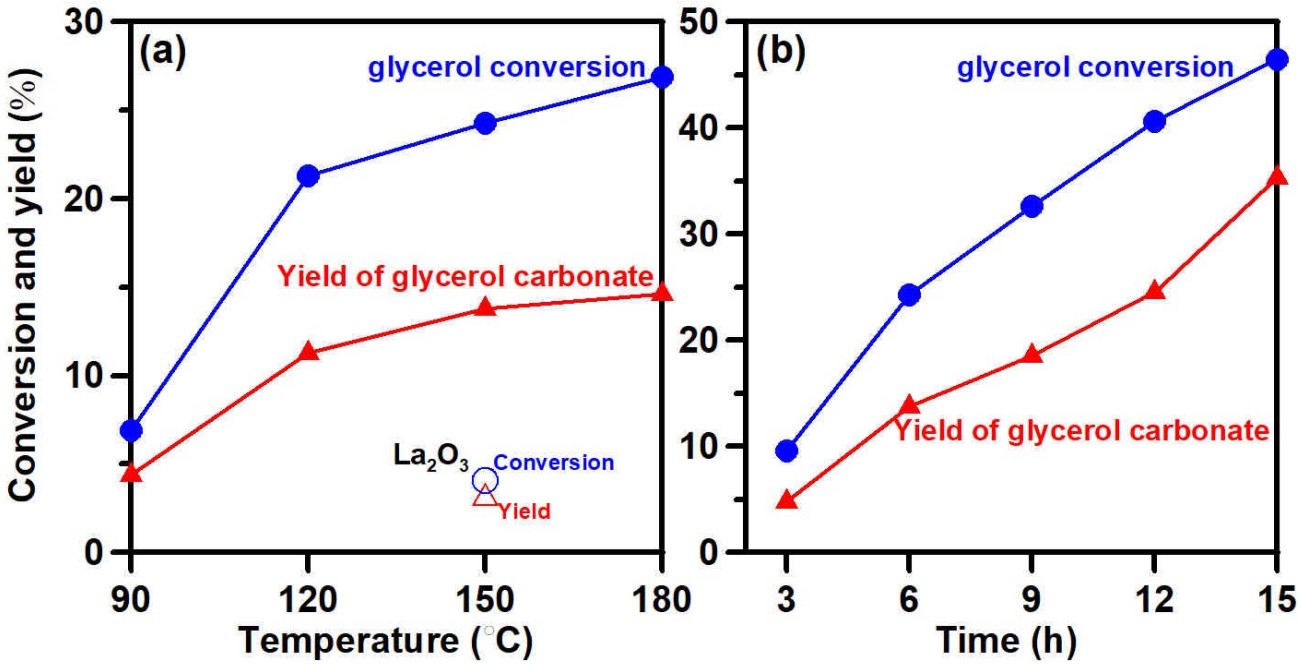

Figure S5 Catalytic CO_2/GL conversion at (a) different temperatures with 6 h of reaction, and (b) different reaction times at a reaction temperature of 150 °C. Reaction conditions: 0.1 g of 5La/ZIF-8 (solid symbols) or La_2O_3 (hollow symbols) catalyst, 5 mL of CH_3CN as the dehydrating agent, 15 mL of glycerol and 7 bar of CO_2 atmosphere.

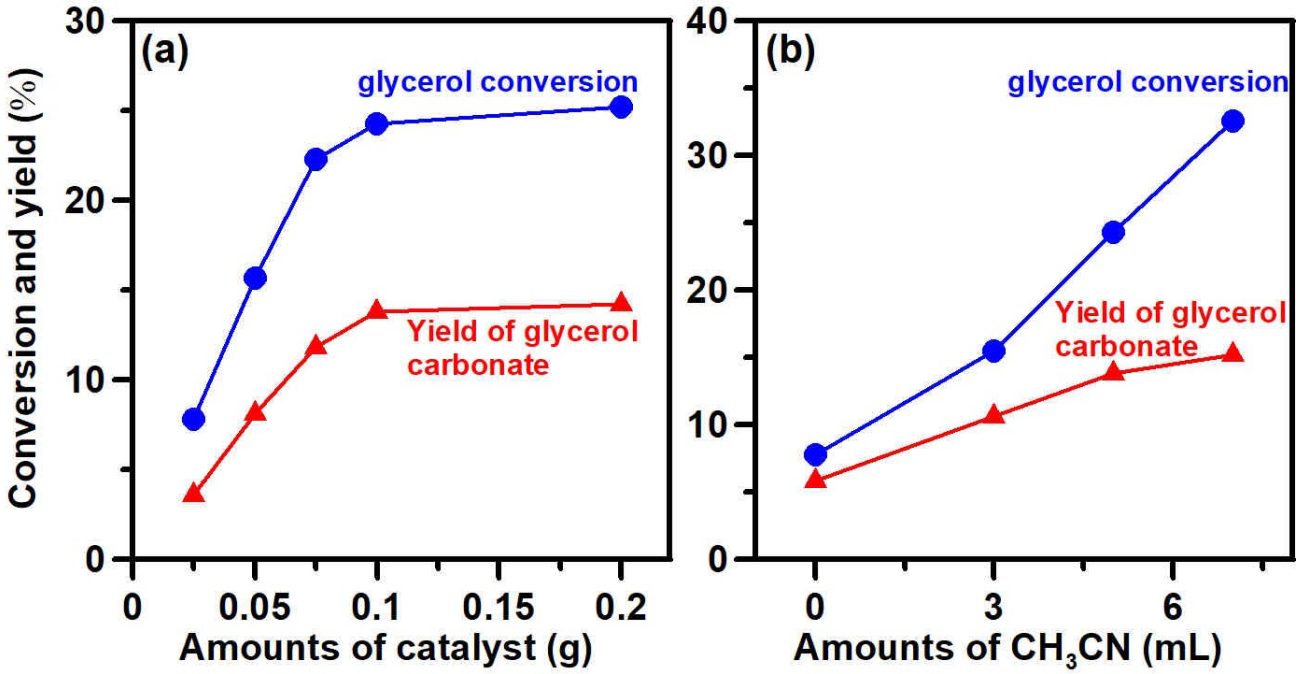

Figure S6 Catalytic CO_2/GL conversion using (a) different amounts of catalyst (0.025, 0.05, 0.075, 0.1, and 0.2 g) with 5 mL of CH_3CN as the dehydrating agent and (b) different amounts of CH_3CN (0, 3, 5, and 7 mL) with 0.1 g of 5La-ZIF-8 as catalyst. Reaction conditions: 15 mL of glycerol and 7 bar of CO_2 atmosphere at reaction temperature of 150 °C for 6 h.

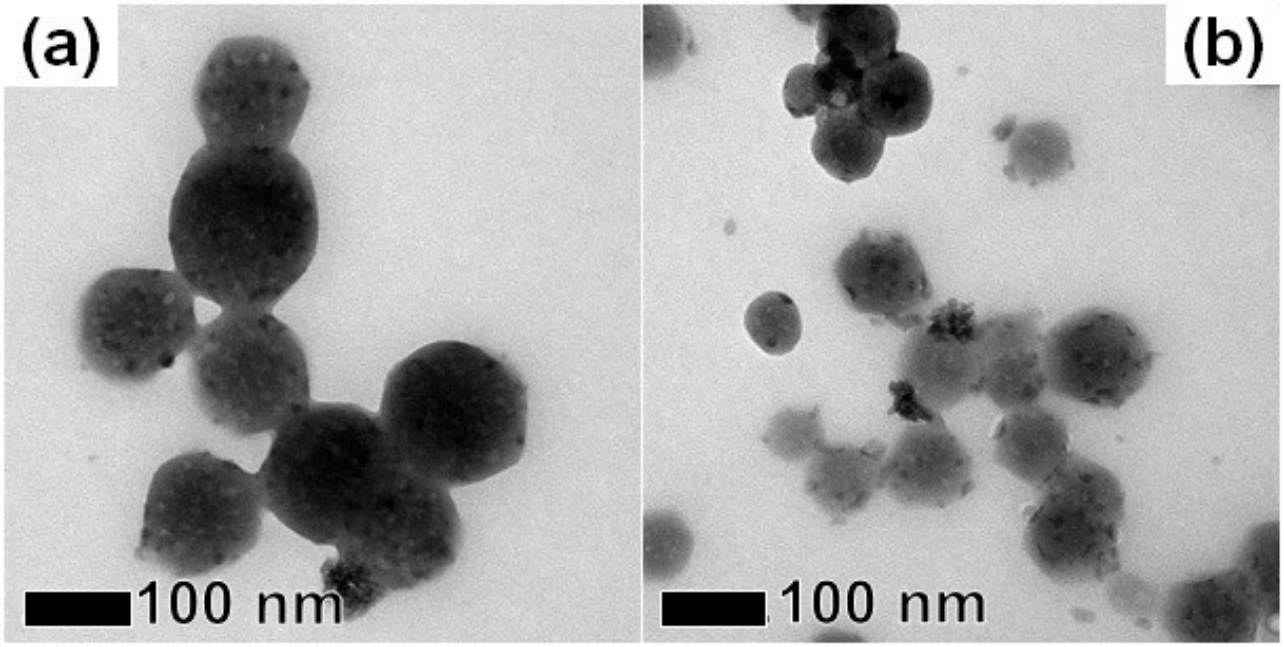

Figure S7 TEM images of 5La/ZIF-8 (a) before and (b) after the catalytic CO_2/GL reaction.

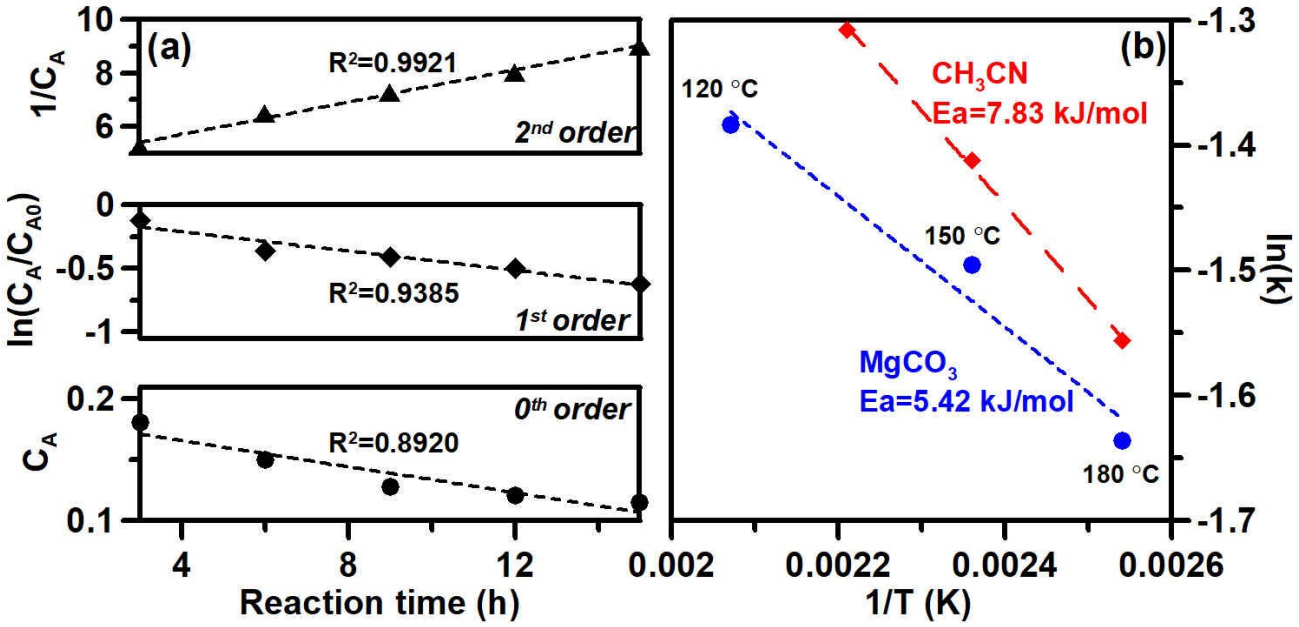

Figure S8 (a) The calculation of reaction orders and (b) the activation energy for the catalytic CO_2/GL conversion using CH_3CN or $MgCO_3$ as the dehydrating agent. The dehydrating agent in (a) is CH_3CN, and the C_A refers to the concentration of glycerol.