

Submitted to *Catalysts*

Supporting information

CO₂ Methanation over CeO₂–supported Co Catalysts

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Table S1. Quantitative analysis of the CO₂-TPD data.^a

Catalyst	Peak 1 (< 200 °C)		Peak 2 (200-300 °C)		Peak 3 (300-600 °C)	
	Peak area (%)	CO ₂ uptake (μmol/g _{cat})	Peak area (%)	CO ₂ uptake (μmol/g _{cat})	Peak area (%)	CO ₂ uptake (μmol/g _{cat})
Co _{0.1} Ce _{0.9} O _x (300)	-	-	38	47	62	77
Co _{0.1} Ce _{0.9} O _x (500)	37	54	-	-	63	92
Co _{0.1} Ce _{0.9} O _x (700)	47	28	-	-	53	31
Co/CeO ₂ (300)	42	52	-	-	58	70
Co/CeO ₂ (500)	38	47	-	-	62	76
Co/CeO ₂ (700)	39	48	-	-	61	74

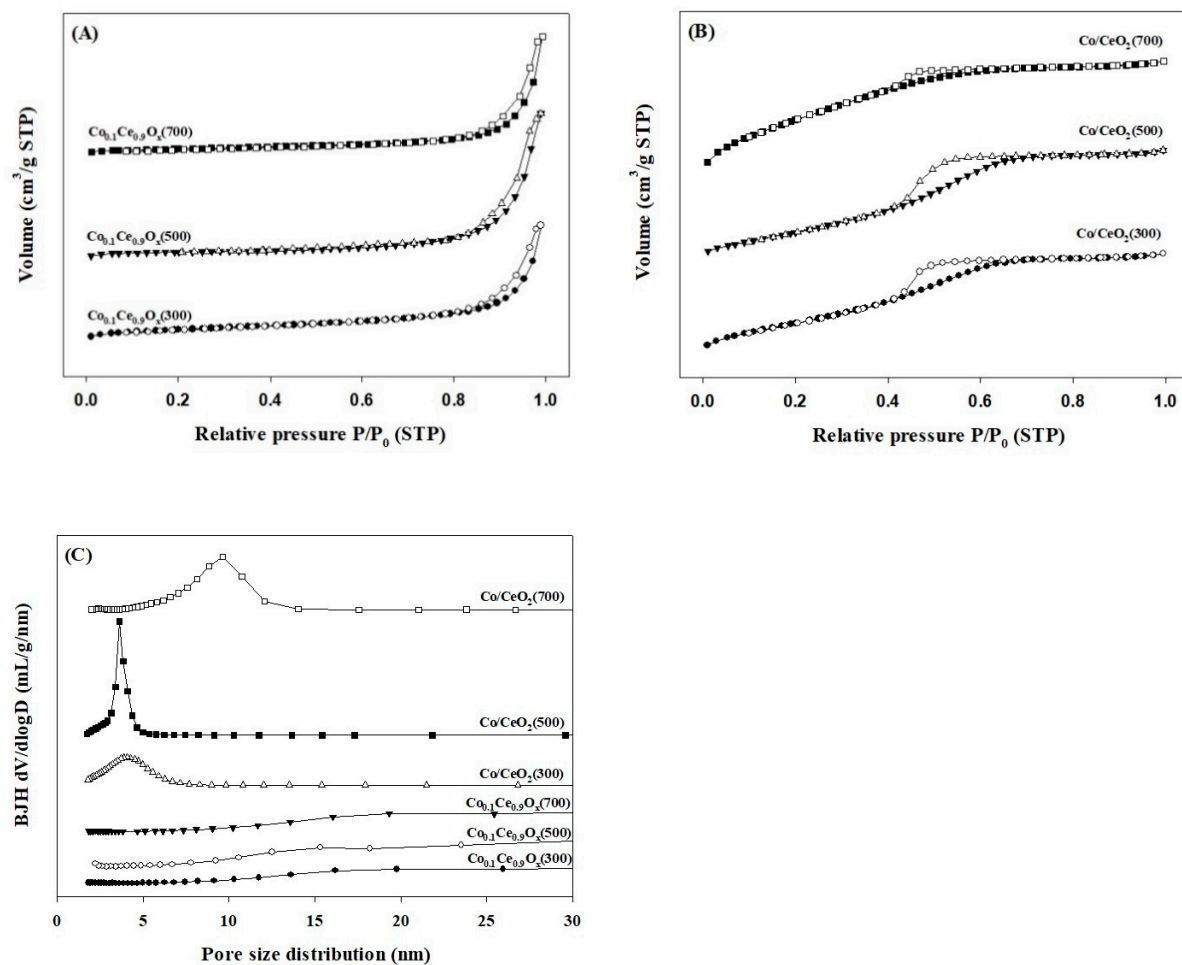


Figure S1. Nitrogen adsorption and desorption isotherms (A, B) and pore size distribution (C) of ceria-supported cobalt catalysts calcined in air at different temperatures.

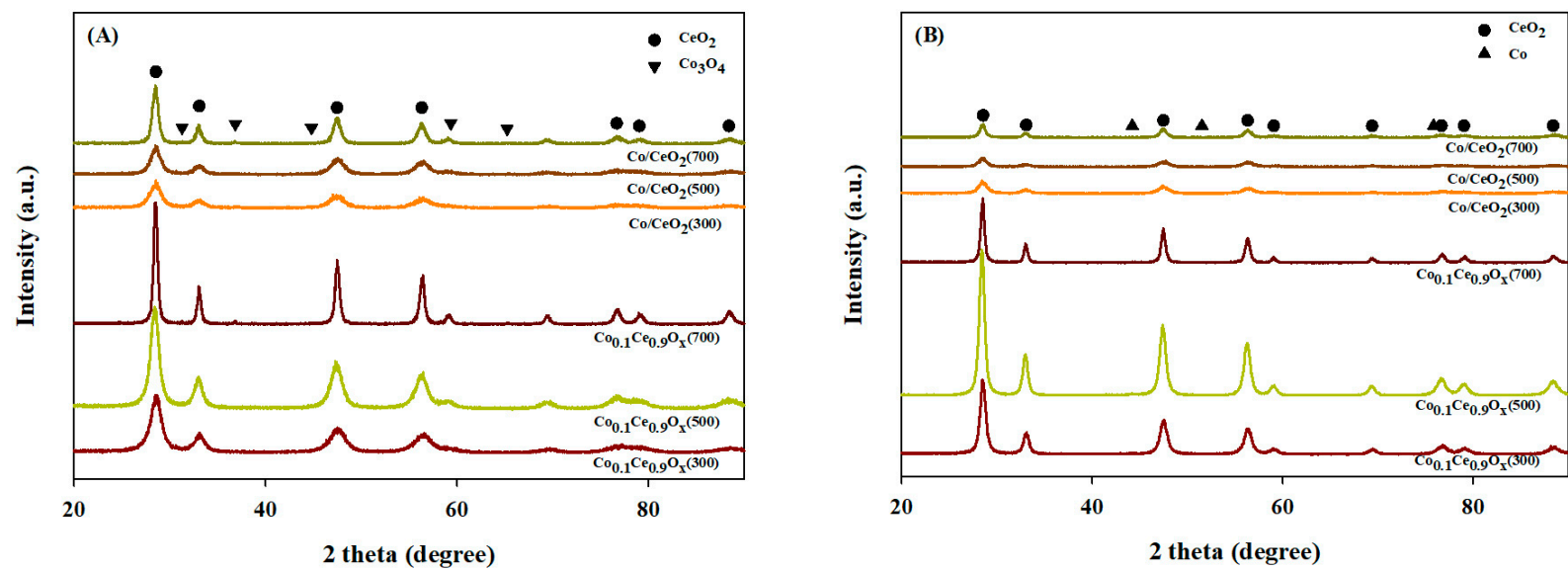


Figure S2. XRD patterns of ceria-supported cobalt catalysts calcined in air at different temperatures (A) and after reduction in H_2 at 500 °C (B).

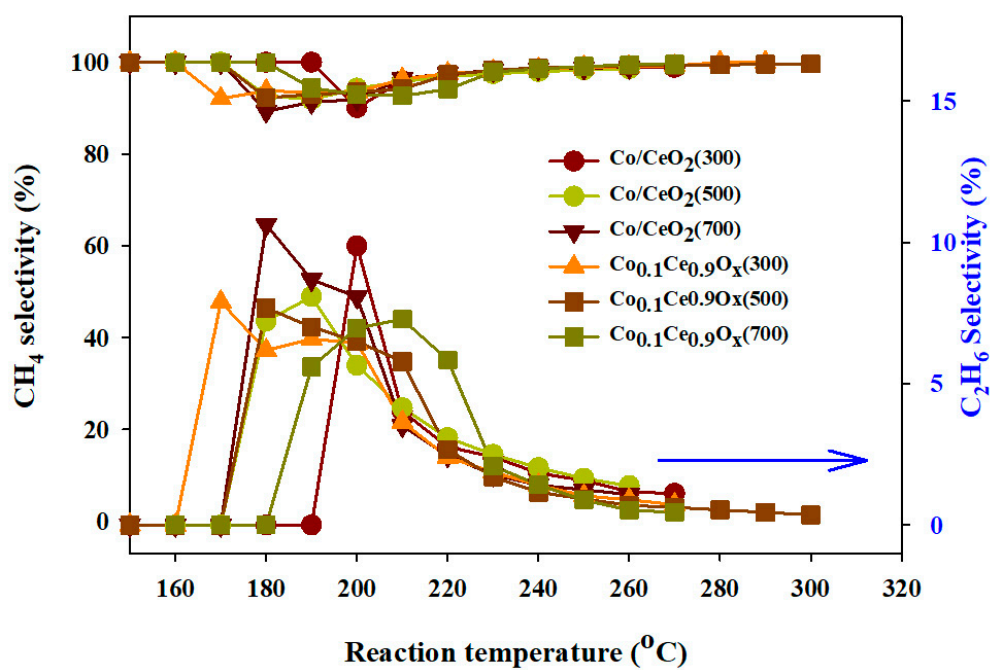


Figure S3. Carbon selectivities for CH₄ and C₂H₆ for CO methanation over ceria-supported cobalt catalysts.

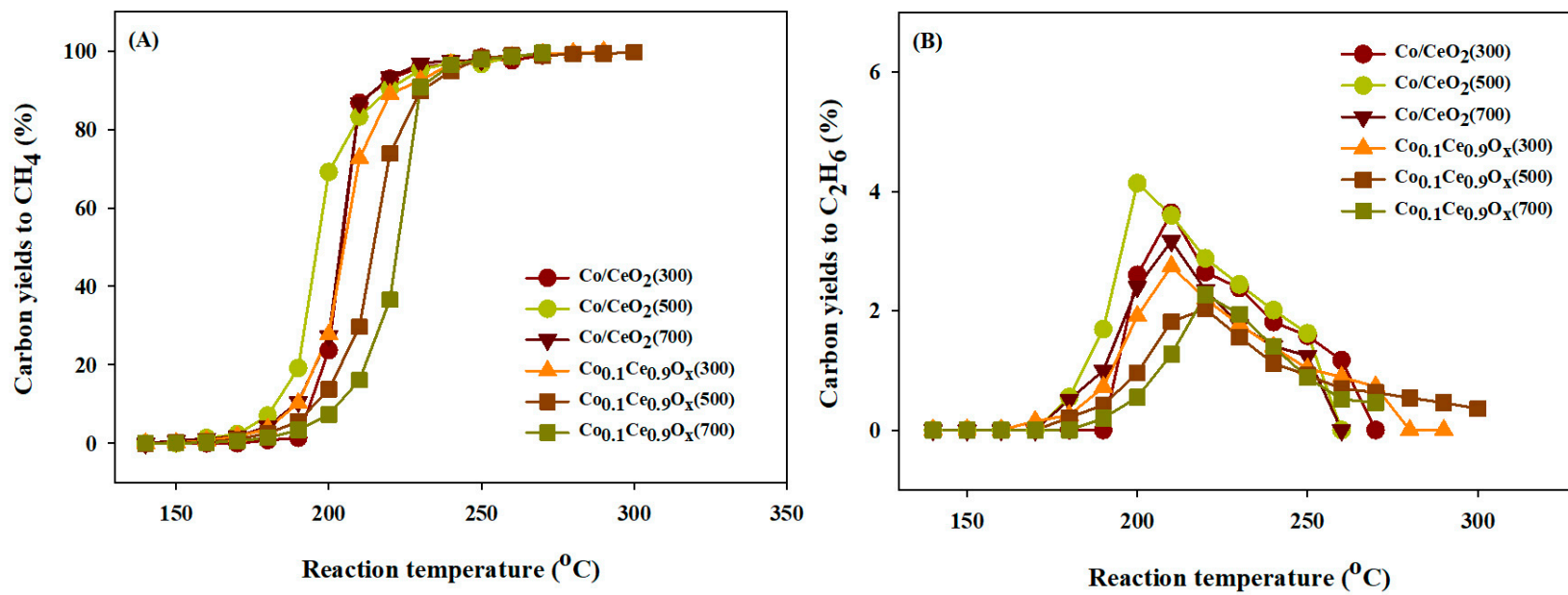


Figure S4. Product yields for CO methanation over ceria-supported cobalt catalysts.

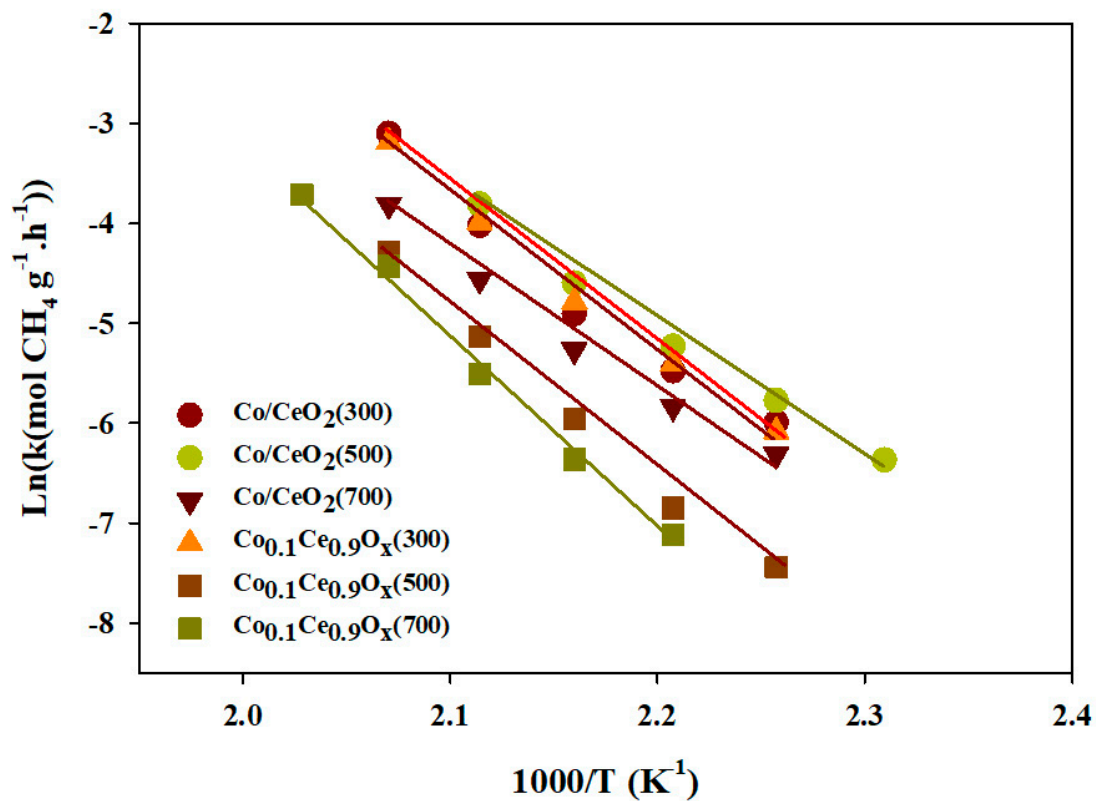


Figure S5. Arrhenius plot for CO methanation over ceria-supported cobalt catalysts. All catalysts were reduced in H₂ at 500 °C. The feed gas is composed of 1 mol% CO, 49 mol% He, and 50 mol% H₂ and total flow rate is 100 mL/min.

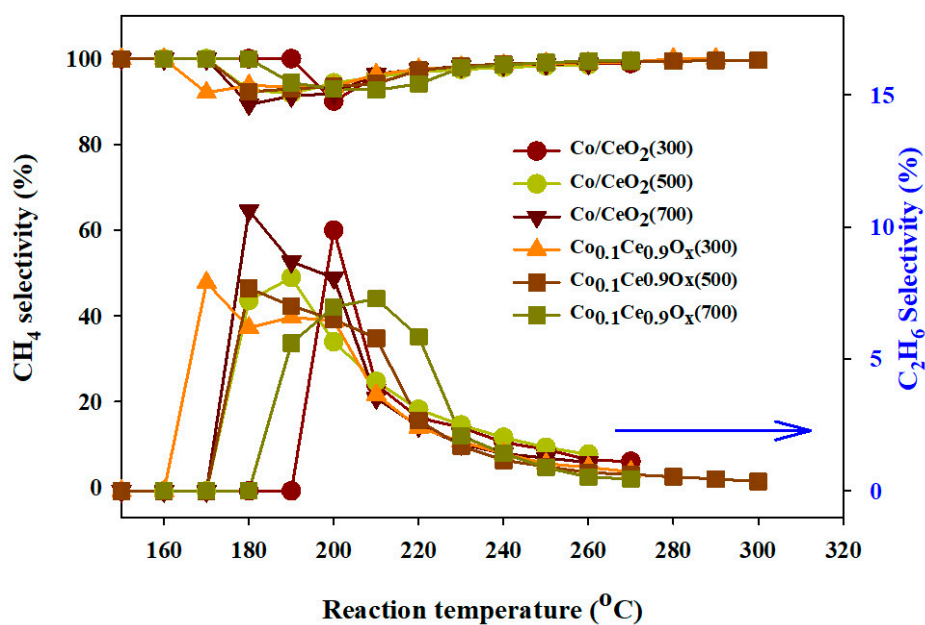


Figure S6. Carbon selectivities for CH₄ and CO for CO₂ methanation over ceria-supported cobalt catalysts.

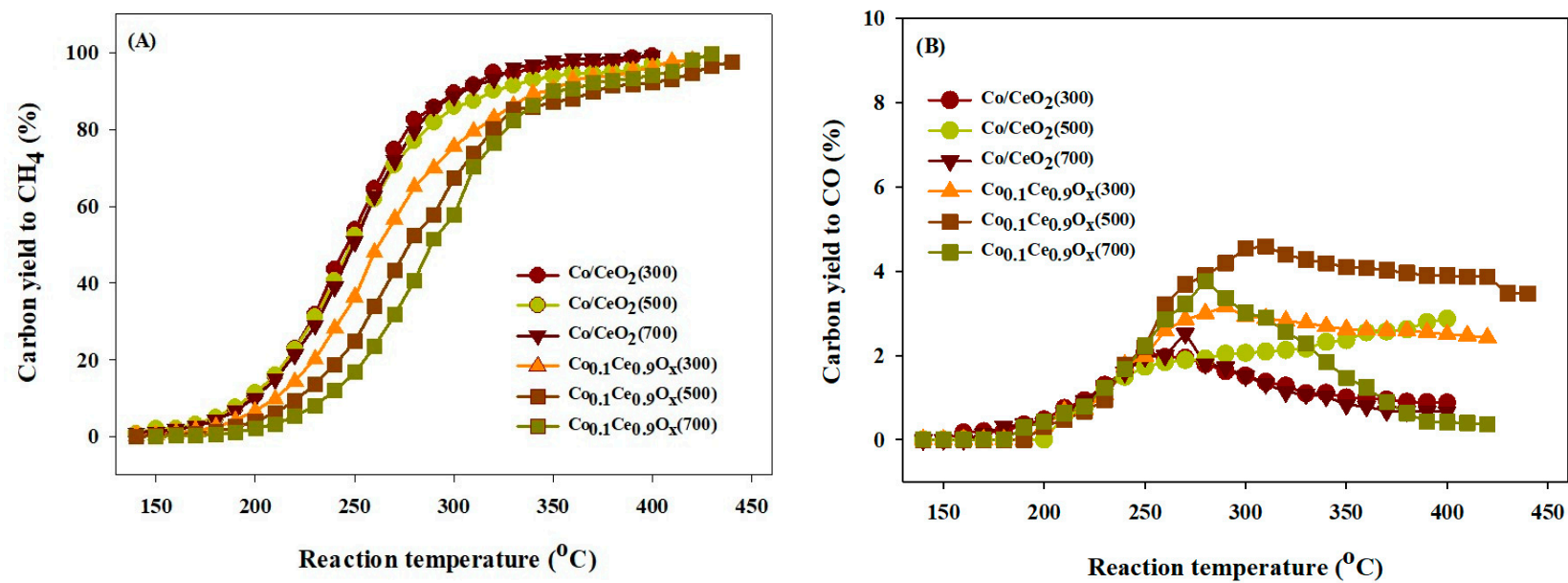


Figure S7. Product yields for CO₂ methanation over ceria-supported cobalt catalysts.

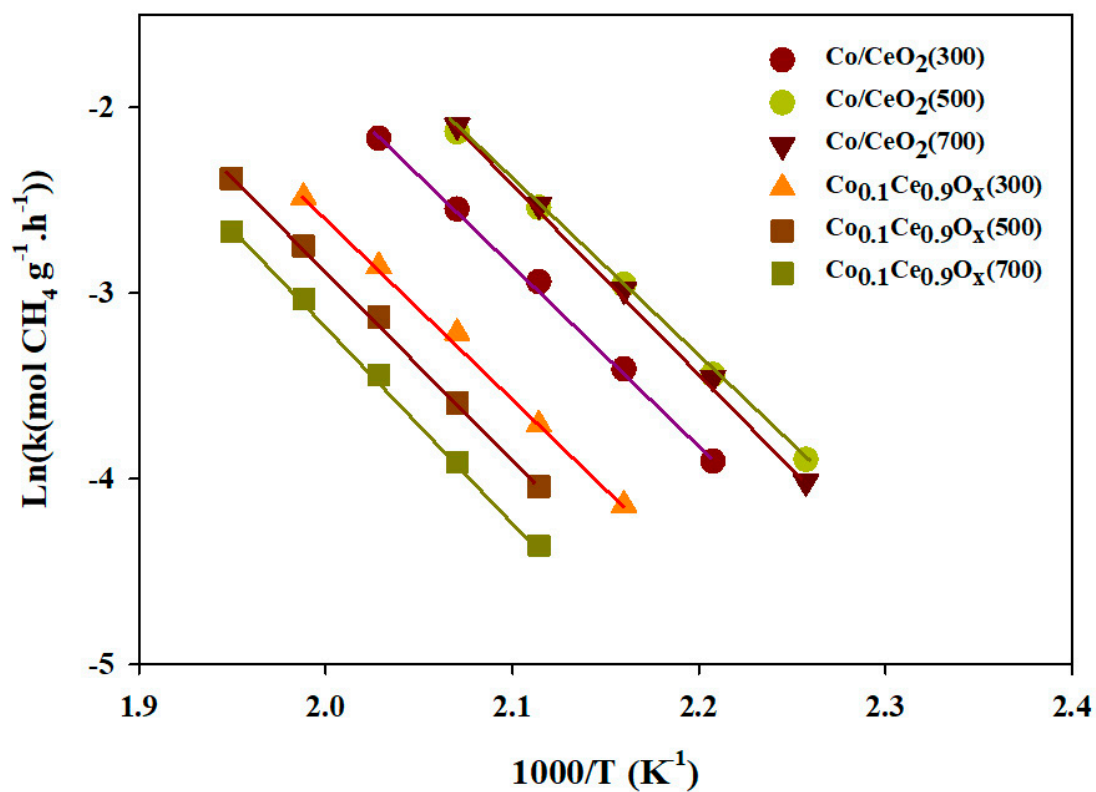


Figure S8. Arrhenius plot for CO₂ methanation over ceria-supported cobalt catalysts. All catalysts were reduced in H₂ at 500 °C. The feed gas is composed of 1 mol% CO₂, 49 mol% He, and 50 mol% H₂ and total flow rate is 100 mL/min.

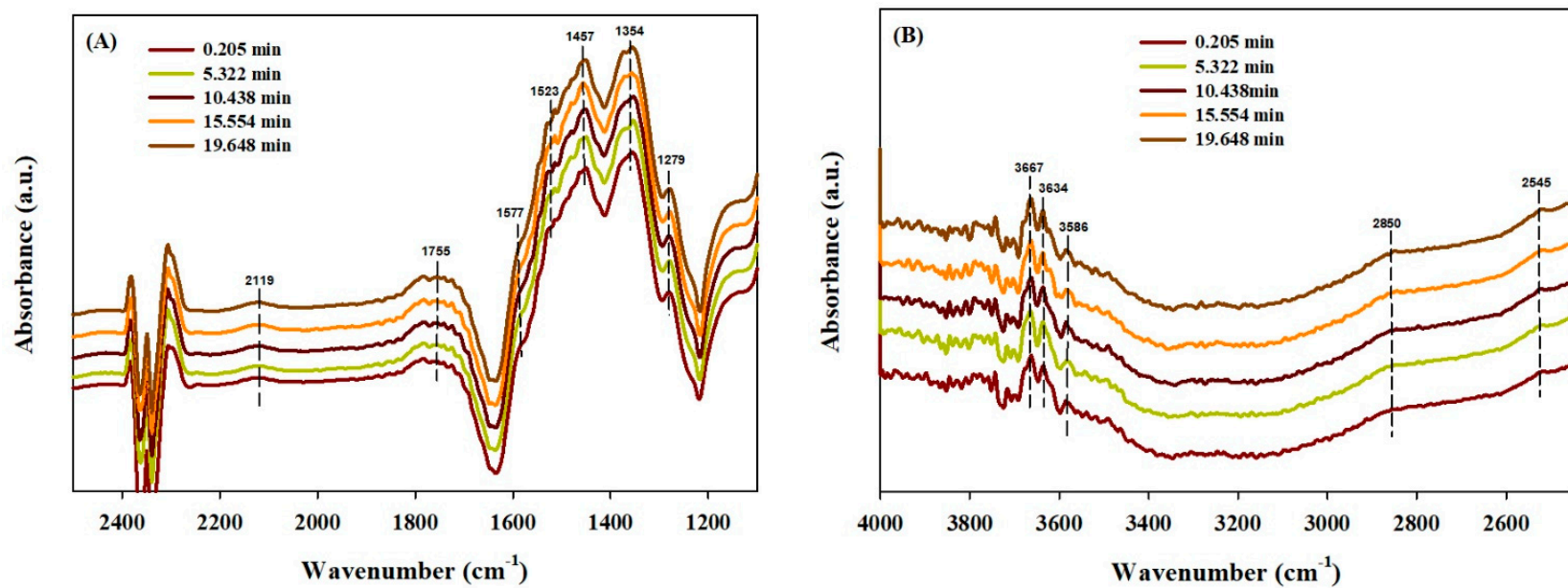


Figure S9. *In-situ* DRIFTS spectra after adsorption of CO₂ on Co_{0.1}Ce_{0.9}O_x(300) catalyst at 300 °C. The feed is composed of 33 mol% CO₂ and 67 mol% He.

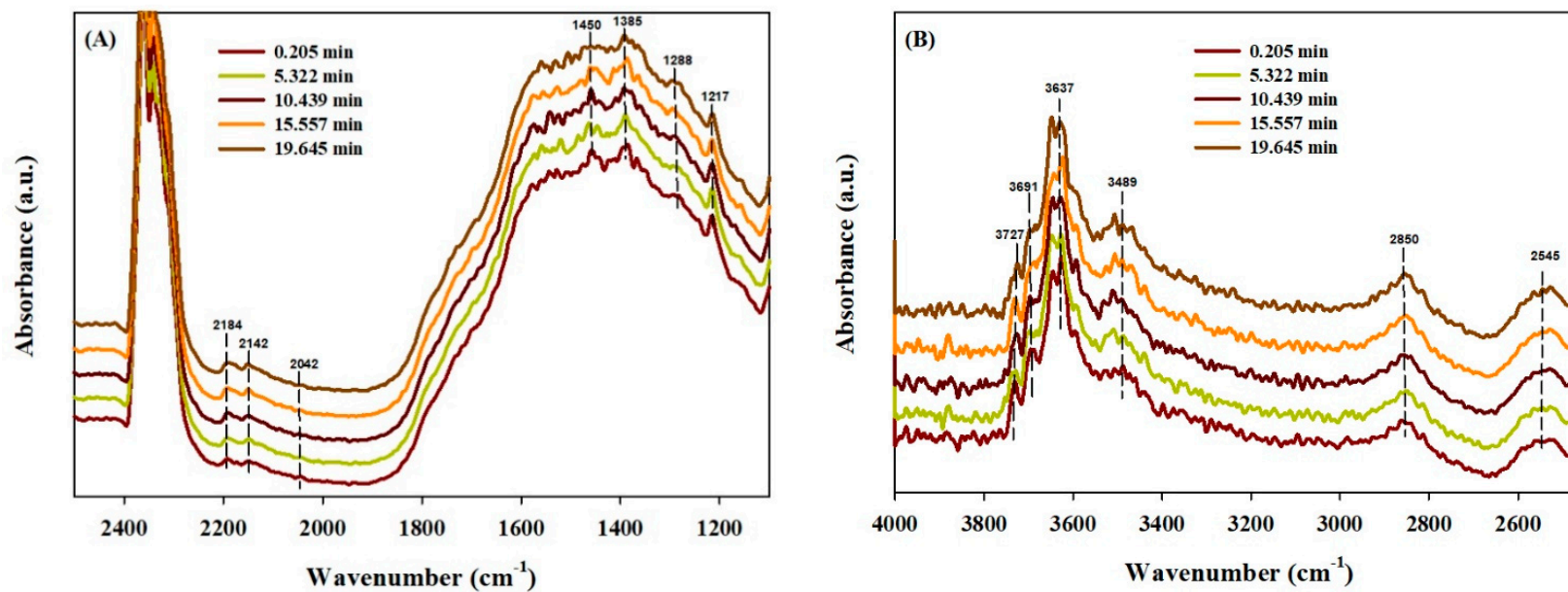


Figure S10. *In-situ* DRIFTS spectra after adsorption of CO₂ on Co/CeO₂(500) catalyst at 300 °C. The feed is composed of 33 mol% CO₂ and 67 mol% He.