Supplementary material

Effects of CO\textsubscript{2} to deactivation behaviors of Co/Al\textsubscript{2}O\textsubscript{3} and Co/SiO\textsubscript{2} for CO hydrogenation to hydrocarbons

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Figure S1. Pore size distribution of the fresh Co/γ-Al\textsubscript{2}O\textsubscript{3} and Co/SiO\textsubscript{2} catalysts

Figure S2. PXRD patterns of the fresh Co/γ-Al\textsubscript{2}O\textsubscript{3} [from ref. 8] and Co/SiO\textsubscript{2} catalysts

Figure S3. H\textsubscript{2}-TPR profiles of the fresh Co/γ-Al\textsubscript{2}O\textsubscript{3} and Co/SiO\textsubscript{2} catalysts at a heating rate of 5 °C/min from 100 to 1100 °C

Figure S4. XPS analysis of (A) Al 2p of the Co/γ-Al\textsubscript{2}O\textsubscript{3} and (B) Si 2p of the Co/SiO\textsubscript{2} on the fresh (only reduction), used catalysts after FTS reaction without CO\textsubscript{2} addition and used catalysts after FTS reaction with 20%CO\textsubscript{2} addition

Figure S5. Schemes of FT-IR analyses for the successive adsorption of CO → CO\textsubscript{2} → CO on the reduced CoAl and CoSi after H\textsubscript{2} purge at each step to verify the oxidation-reduction properties of the supported cobalt nanoparticles

Figure S6. FT-IR analysis of adsorbed CO molecules on the (A) Co/γ-Al\textsubscript{2}O\textsubscript{3} catalyst and (B) Co/SiO\textsubscript{2} catalyst for the fresh catalyst, used catalyst without CO\textsubscript{2} addition and used catalyst with CO\textsubscript{2} addition

Figure S7. CO conversion and product distribution with time one stream on the (A) Co/γ-Al\textsubscript{2}O\textsubscript{3} without CO\textsubscript{2} addition, (B) Co/γ-Al\textsubscript{2}O\textsubscript{3} with 20vol%CO\textsubscript{2} addition, (C) Co/SiO\textsubscript{2} without CO\textsubscript{2} addition and (D) Co/SiO\textsubscript{2} with 20vol%CO\textsubscript{2} addition
Figure S8. Cobalt particle size distributions from the TEM images of (A) Co/γ-Al₂O₃, (B) Co/SiO₂: (1) reduced catalyst, (2) used catalyst without CO₂ addition and (3) used catalyst with CO₂ addition
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