

Supplementary Information for

Effect of catalyst support on cobalt catalysts for ethylene oligomerization into linear olefins

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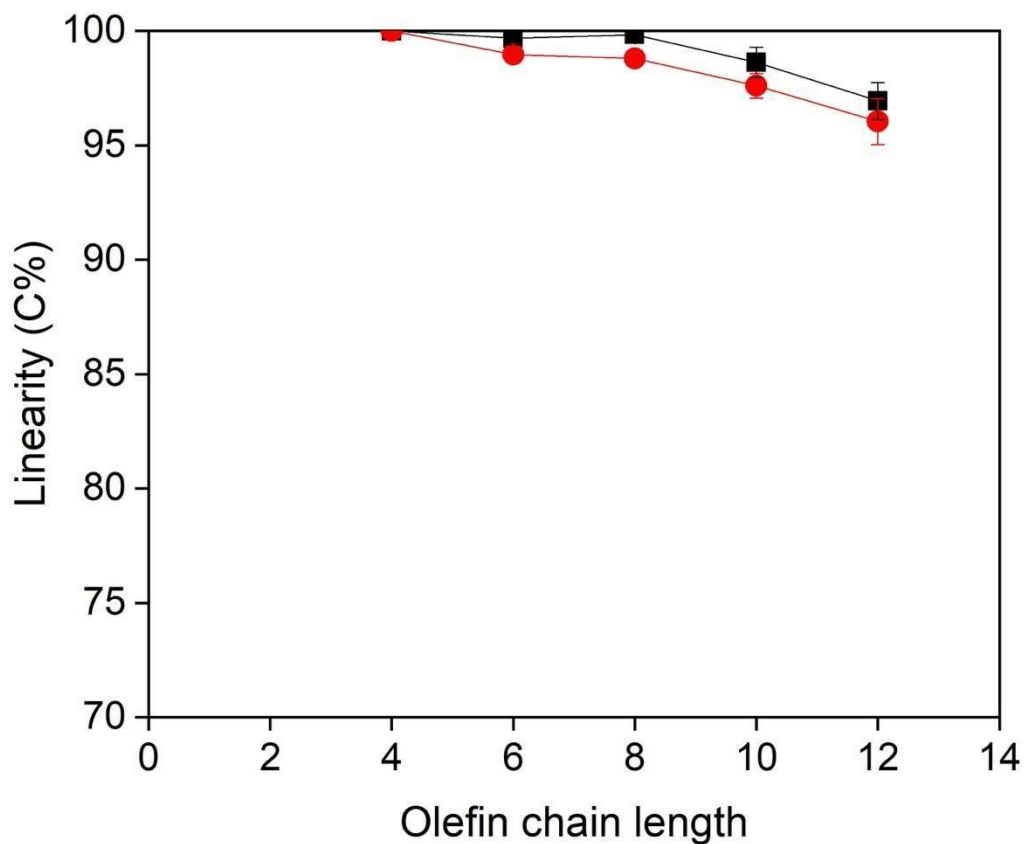


Fig. S1 Product linearities of each olefin chain length from ethylene oligomerization over 12 wt% CoO_x/MRX-HTTC (black square) and 12 wt% CoO_x/MRX-AWC (red circle) at similar (5.0-8.2%) conversions. Reaction conditions for 12 wt% CoO_x/MRX-HTTC: 200 °C, 16 bar ethylene, 16 bar argon, 0.36 h contact time, and 5.0% average conversion. Reaction conditions for 12 wt% CoO_x/MRX-AWC: 200 °C, 16 bar ethylene, 16 bar argon, 1.45 h contact time, and 8.2% average conversion.

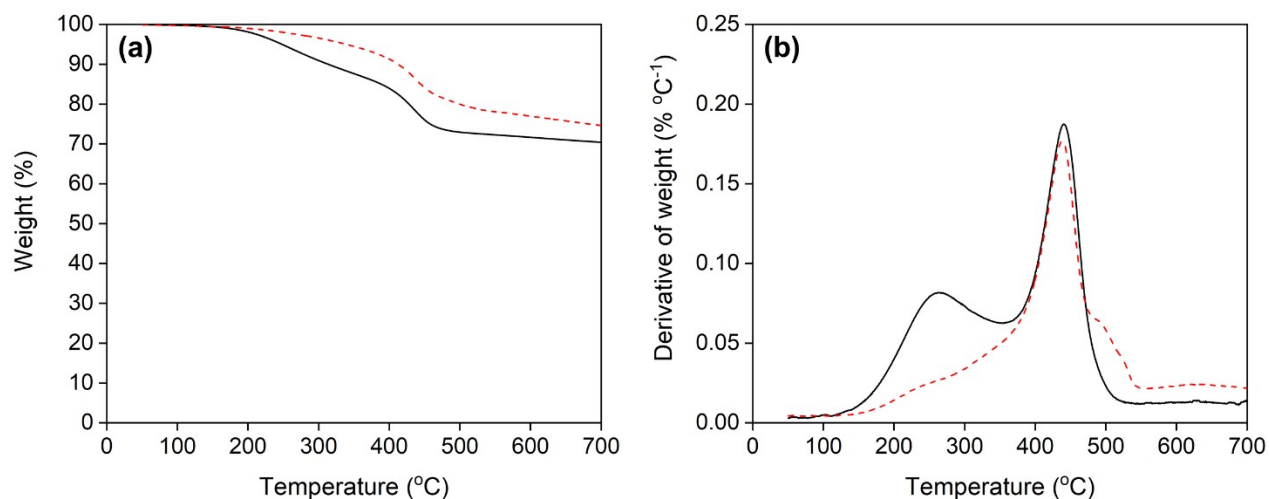


Fig. S2 Thermogravimetric analysis (TGA) curves of the spent 12 wt% CoO_x/MRX-HTTC (black solid line) and the spent 12 wt% CoO_x/MRX-AWC (red dashed line) after reactions at 200 °C, 16 bar ethylene, 16 bar argon, and 1.45 h contact time. TGA conditions: 50 cm³ (STP) min⁻¹ of N₂, 10 °C min⁻¹ ramp rate, and ~10 mg sample. (a) Weight percent versus temperature. (b) Derivative of weight percent versus temperature.

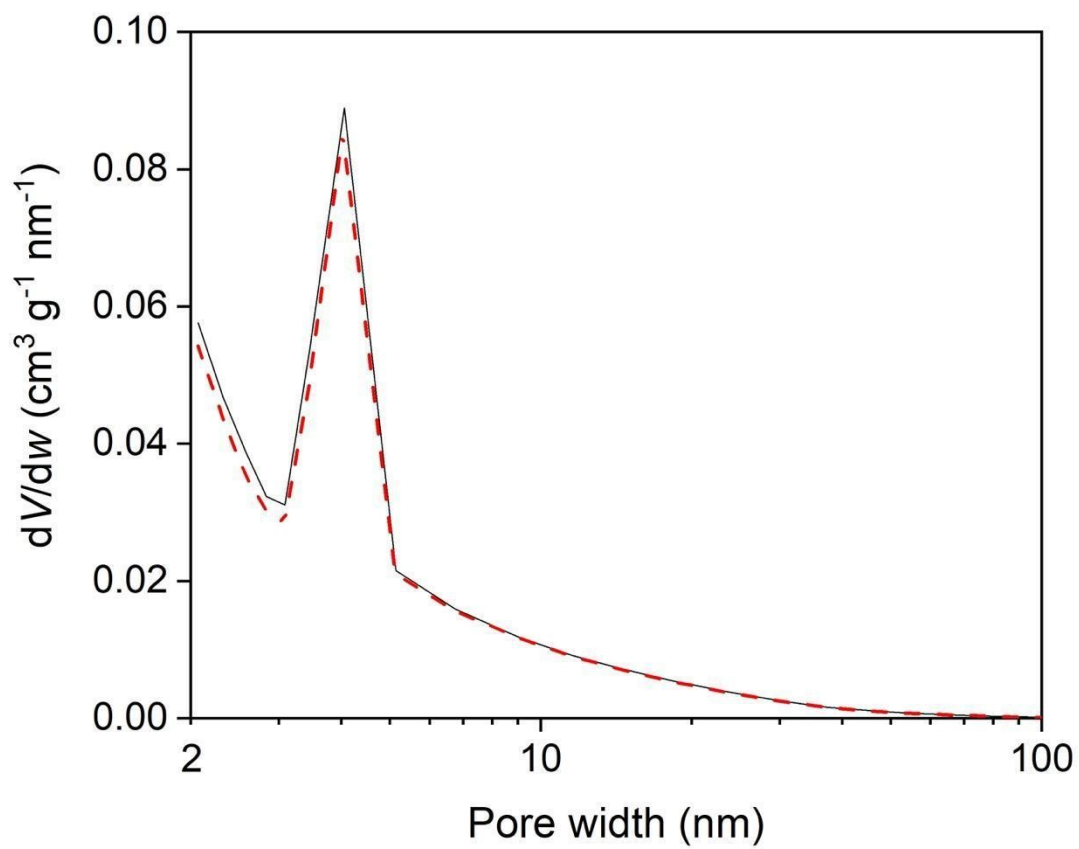


Fig. S3 BJH pore size distributions of MRX-HTTC (black solid line) and MRX-AWC (red dashed line).

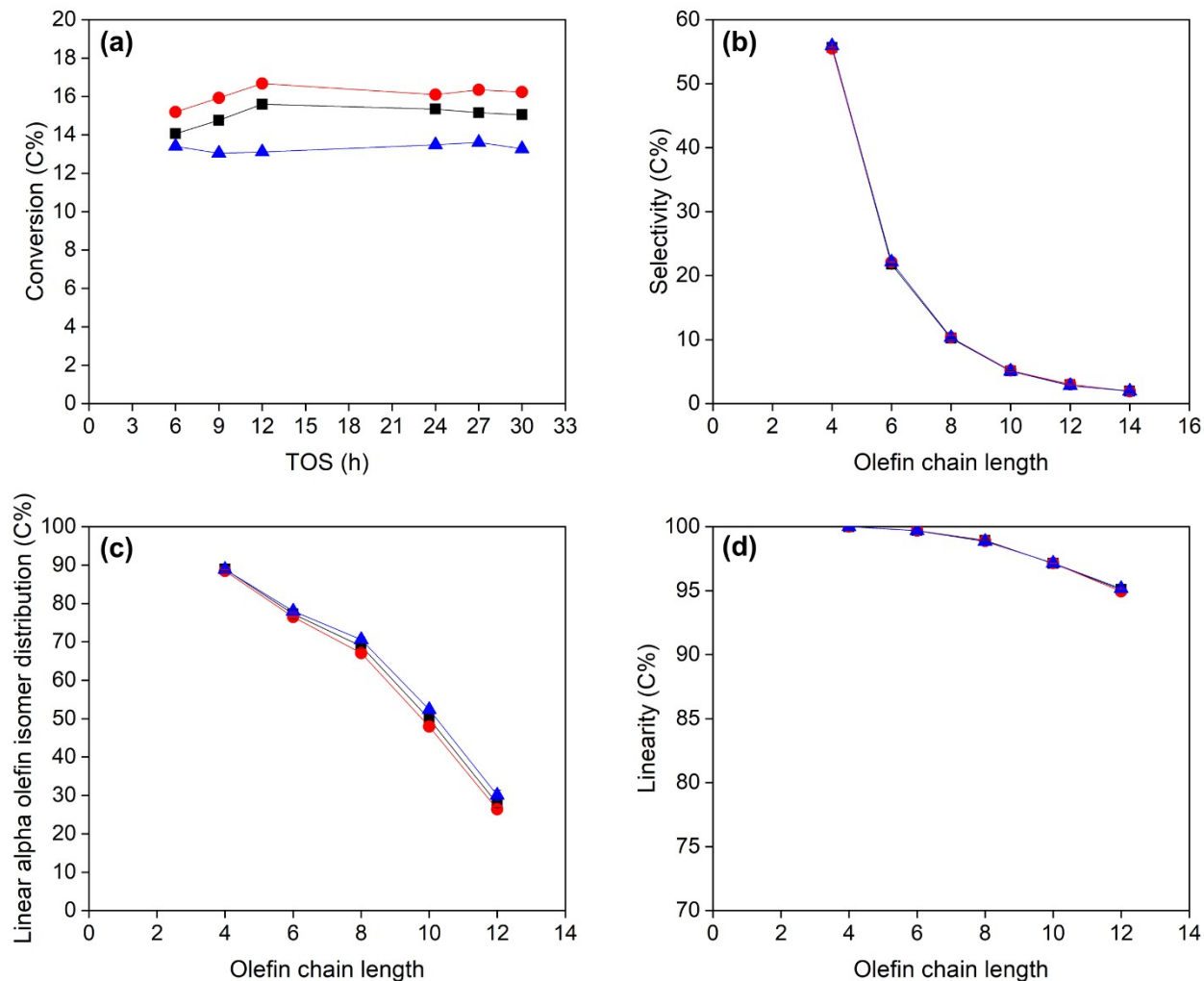


Fig. S4 Ethylene conversions and product selectivities with 12 wt% CoO_x/MRX-HTTC and 425 μm (black square), 725 μm (red circle), and 925 μm (blue triangle) particle sizes. (a) Ethylene conversions as a function of time on stream (TOS). (b) Product selectivities to each olefin chain length. (c) Linear alpha olefin (LAO) isomer distributions of each olefin chain length. (d) Product linearities of each olefin chain length. Reaction conditions: 200 °C, 16 bar ethylene, 16 bar argon, and 1.45 h contact time.

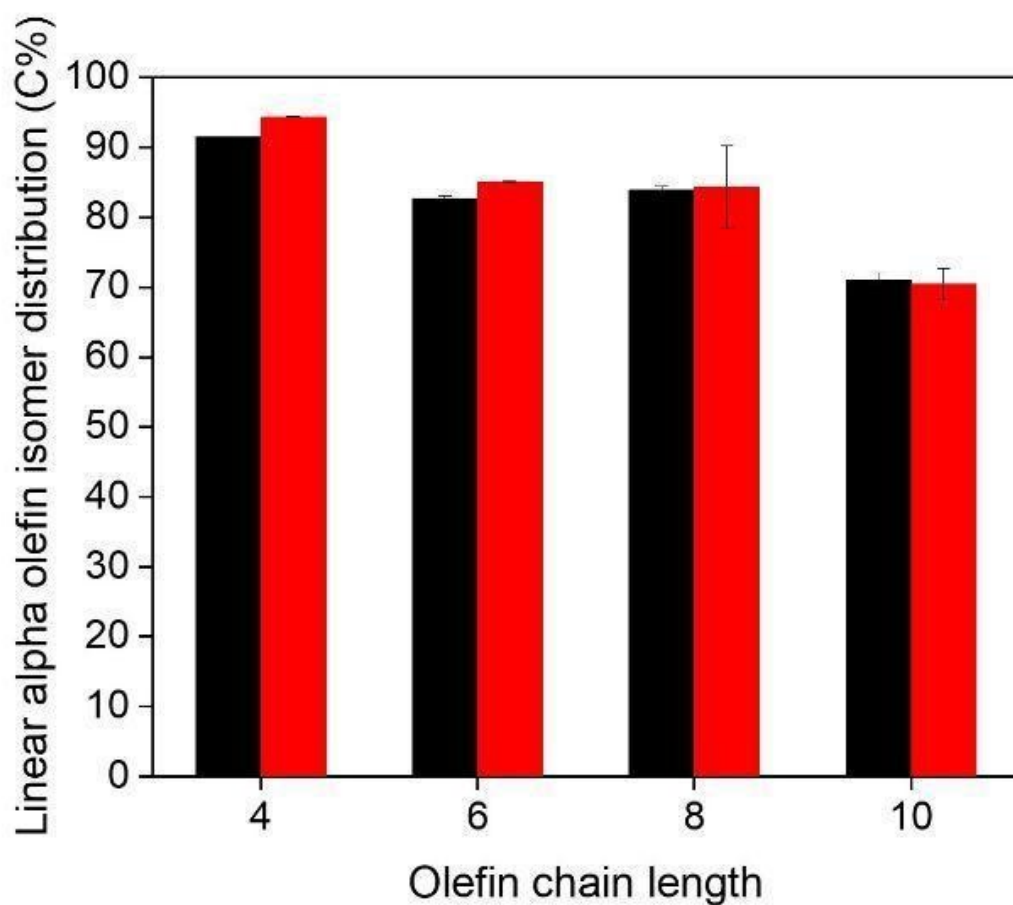


Fig. S5 Linear alpha olefin (LAO) isomer distributions of each olefin chain length from ethylene oligomerization over 12 wt% CoO_x/MRX-HTTC (black) and 12 wt% CoO_x/BG1-HTTC (red) at similar (2.6-5.0%) conversions. Reaction conditions for 12 wt% CoO_x/MRX-HTTC: 200 °C, 16 bar ethylene, 16 bar argon, 0.36 h contact time, and 5.0% average conversion. Reaction conditions for 12 wt% CoO_x/BG1-HTTC: 200 °C, 16 bar ethylene, 16 bar argon, 1.45 h contact time, and 2.6% average conversion.

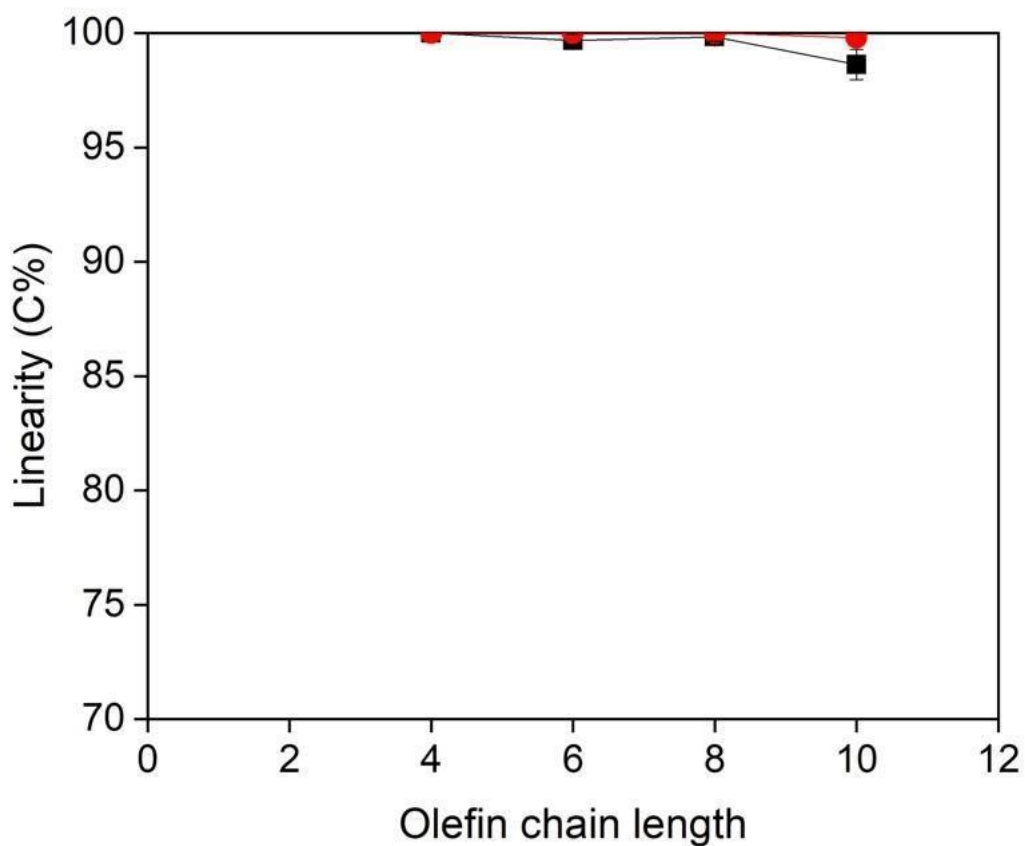


Fig. S6 Product linearities of each olefin chain length from ethylene oligomerization over 12 wt% CoO_x/MRX-HTTC (black square) and 12 wt% CoO_x/BG1-HTTC (red circle) at similar (2.6-5.0%) conversions. Reaction conditions for 12 wt% CoO_x/MRX-HTTC: 200 °C, 16 bar ethylene, 16 bar argon, 0.36 h contact time, and 5.0% average conversion. Reaction conditions for 12 wt% CoO_x/BG1-HTTC: 200 °C, 16 bar ethylene, 16 bar argon, 1.45 h contact time, and 2.6% average conversion.

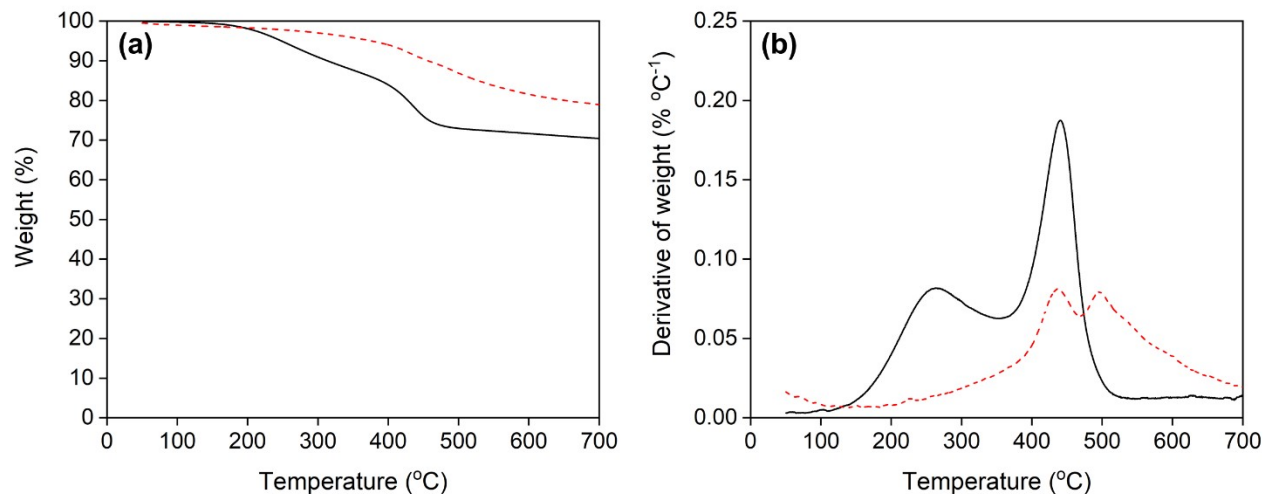


Fig. S7 Thermogravimetric analysis (TGA) curves of the spent 12 wt% CoO_x/MRX-HTTC (black solid line) and the spent 12 wt% CoO_x/BG1-HTTC (red dashed line) after reactions at 200 °C, 16 bar ethylene, 16 bar argon, and 1.45 h contact time. TGA conditions: 50 cm³ (STP) min⁻¹ of N₂, 10 °C min⁻¹ ramp rate, and ~10 mg sample. (a) Weight percent versus temperature. (b) Derivative of weight percent versus temperature.

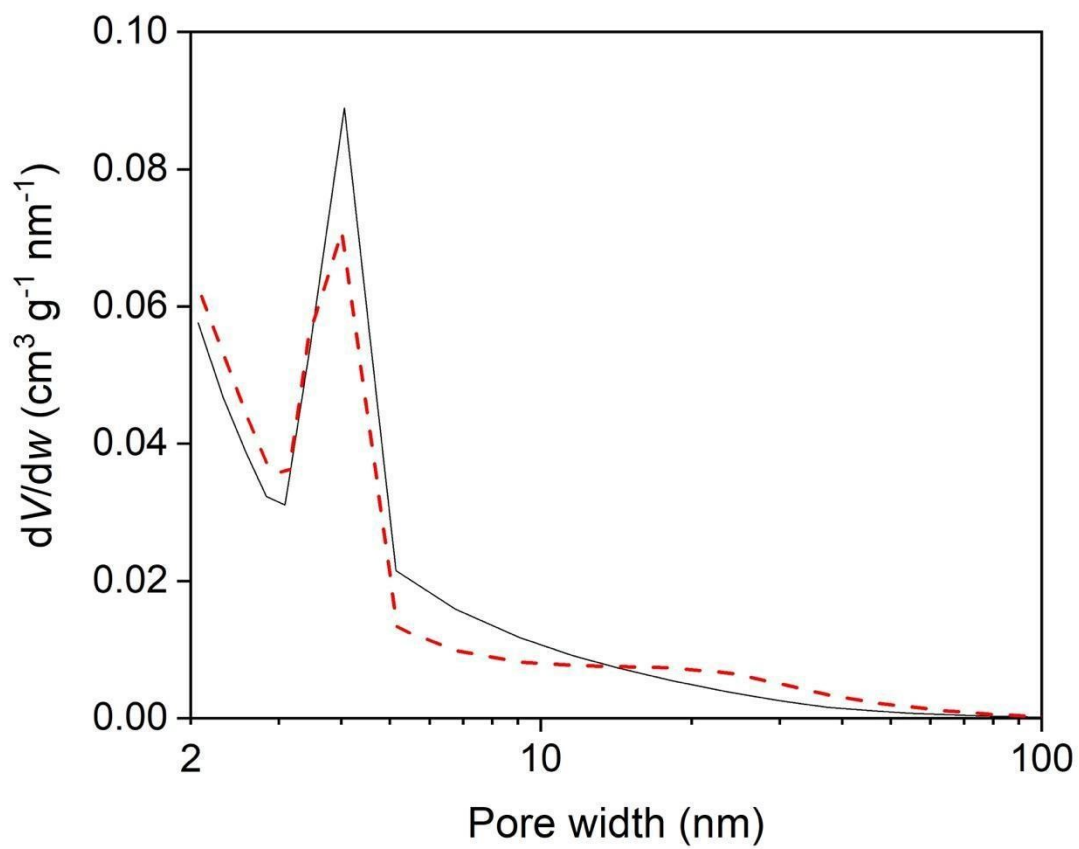


Fig. S8 BJH pore size distributions of MRX-HTTC (black solid line) and BG1-HTTC (red dashed line).