

Supporting Information

Homogeneous Decoration of Metal-Organic Frameworks (MOFs) with Core-Shell Structures on Carbon Nanotubes

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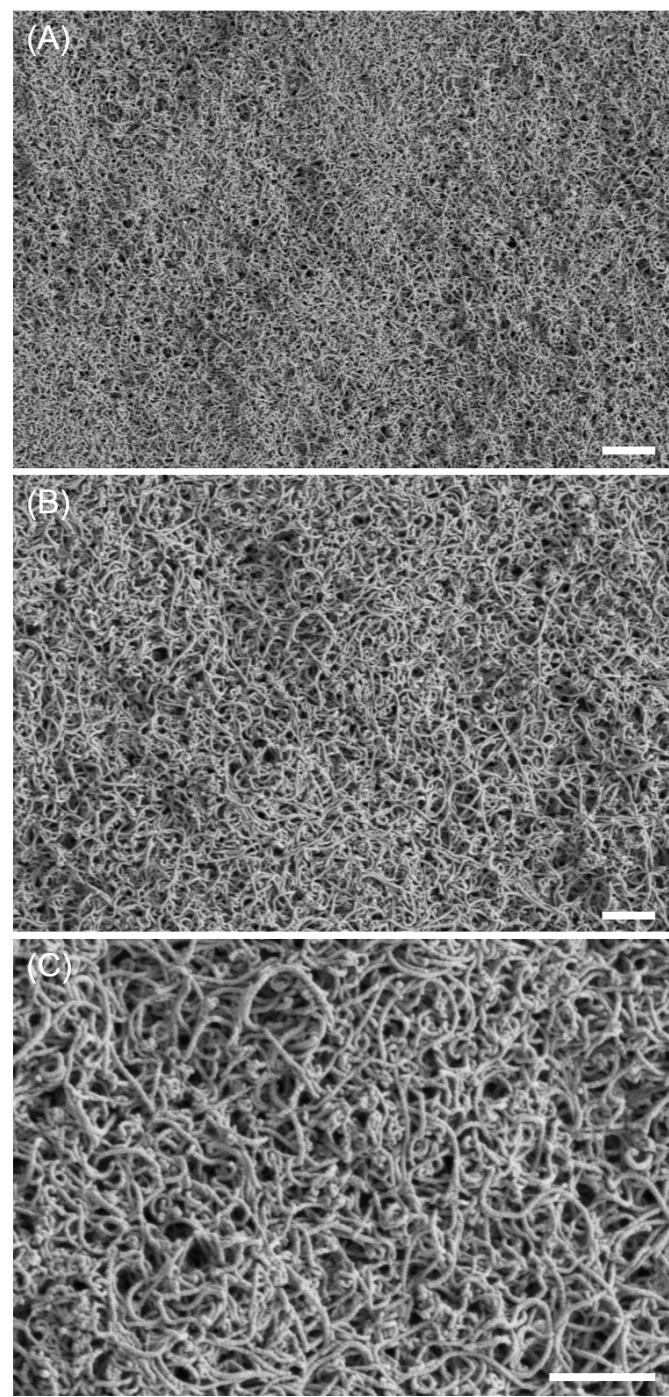


Fig. S1 Scanning electron microscope (SEM) images of the CNT@ZIF-8 core-shell structures at magnifications of (A) 5, (B) 10, and (C) 20 k. Scale bars: (A) 2 and (B and C) 1 μ m.

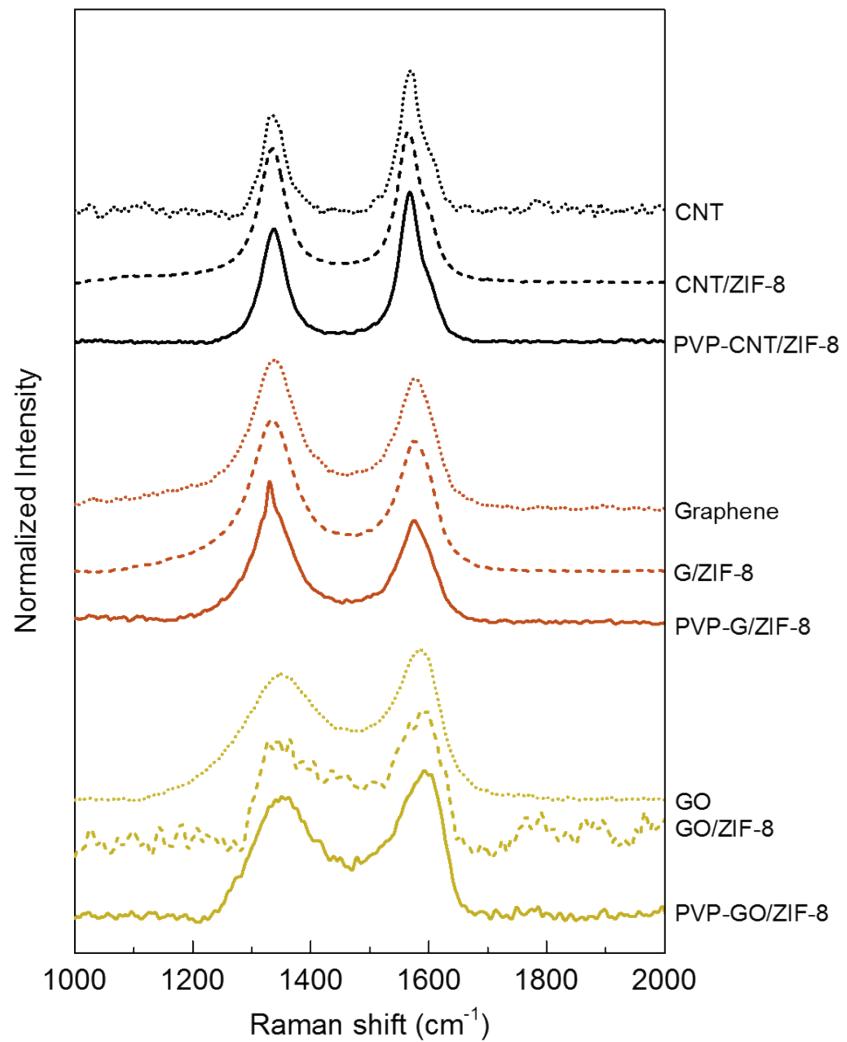


Fig. S2 Raman spectra of the CNT (black dot-line), CNT/ZIF-8 (black dash-line), PVP-CNT/ZIF-8 (black solid-line), graphene (brown dot-line), G/ZIF-8 (brown dash-line), PVP-G/ZIF-8 (brown solid-line), GO (yellow-brown dot-line), GO/ZIF-8 (yellow-brown dash-line), and PVP-GO/ZIF-8 (yellow-brown solid-line).

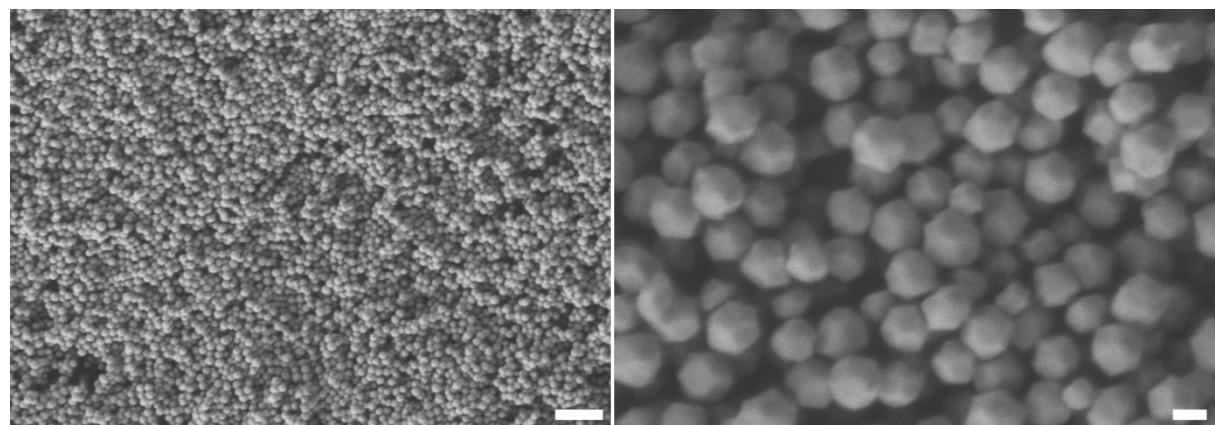


Fig. S3 SEM images of the ZIF-8 at low (left) and high (right) magnifications. Scale bars: 1 μ m (left) and 100 nm (right).

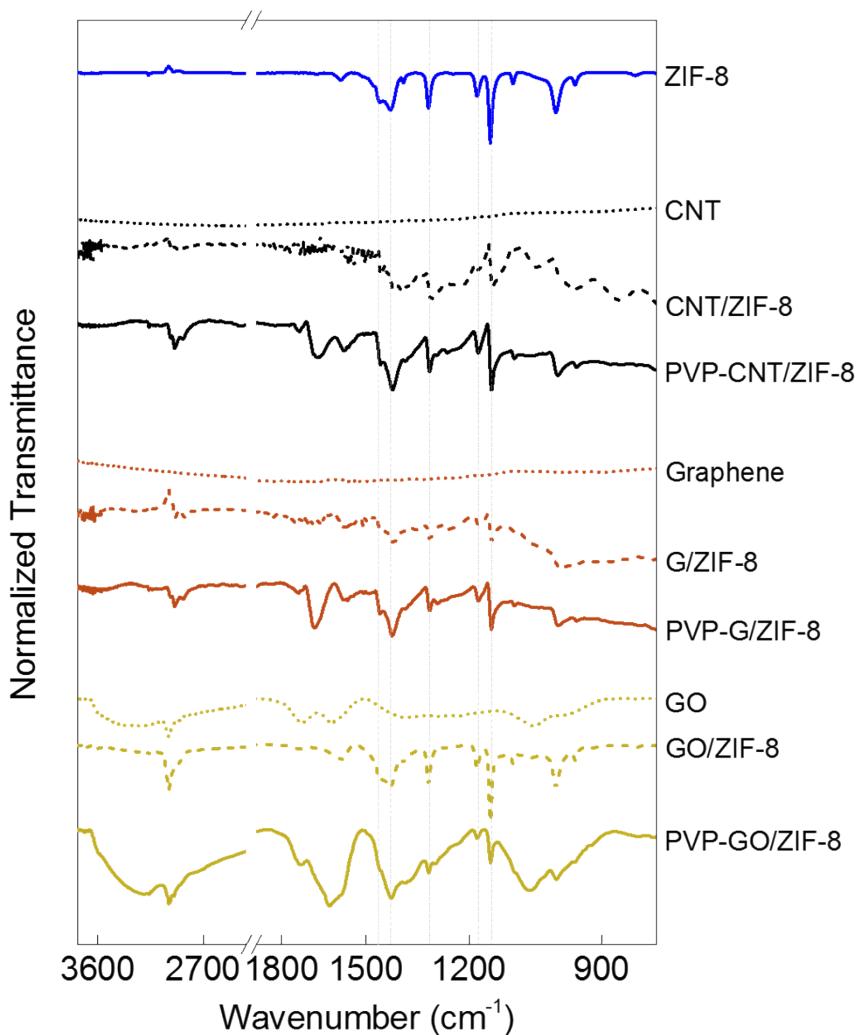


Fig. S4 FT-IR spectra of the ZIF-8 (blue solid-line), CNT (black dot-line), CNT/ZIF-8 (black dash-line), PVP-CNT/ZIF-8 (black solid-line), graphene (brown dot-line), G/ZIF-8 (brown dash-line), PVP-G/ZIF-8 (brown solid-line), GO (yellow-brown dot-line), GO/ZIF-8 (yellow-brown dash-line), and PVP-GO/ZIF-8 (yellow-brown solid-line).

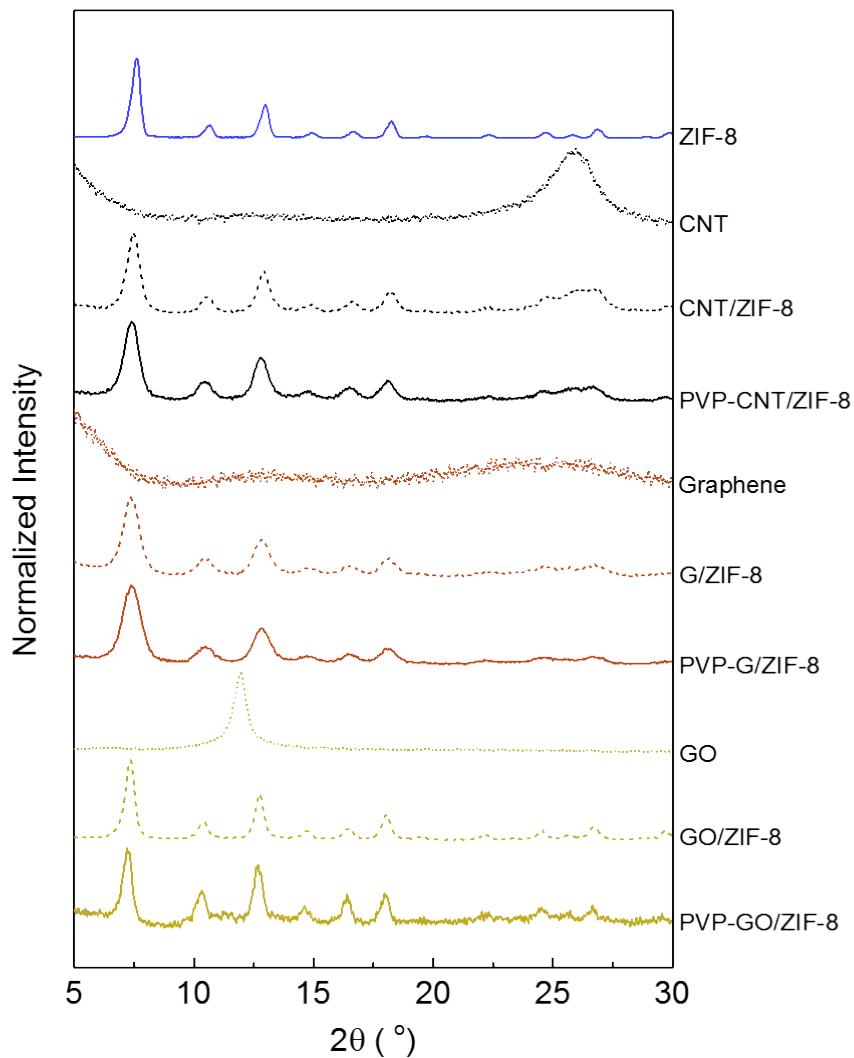


Fig. S5 XRD patterns of the ZIF-8 (blue solid-line), CNT (black dot-line), CNT/ZIF-8 (black dash-line), PVP-CNT/ZIF-8 (black solid-line), graphene (brown dot-line), G/ZIF-8 (brown dash-line), PVP-G/ZIF-8 (brown solid-line), GO (yellow-brown dot-line), GO/ZIF-8 (yellow-brown dash-line), and PVP-GO/ZIF-8 (yellow-brown solid-line).

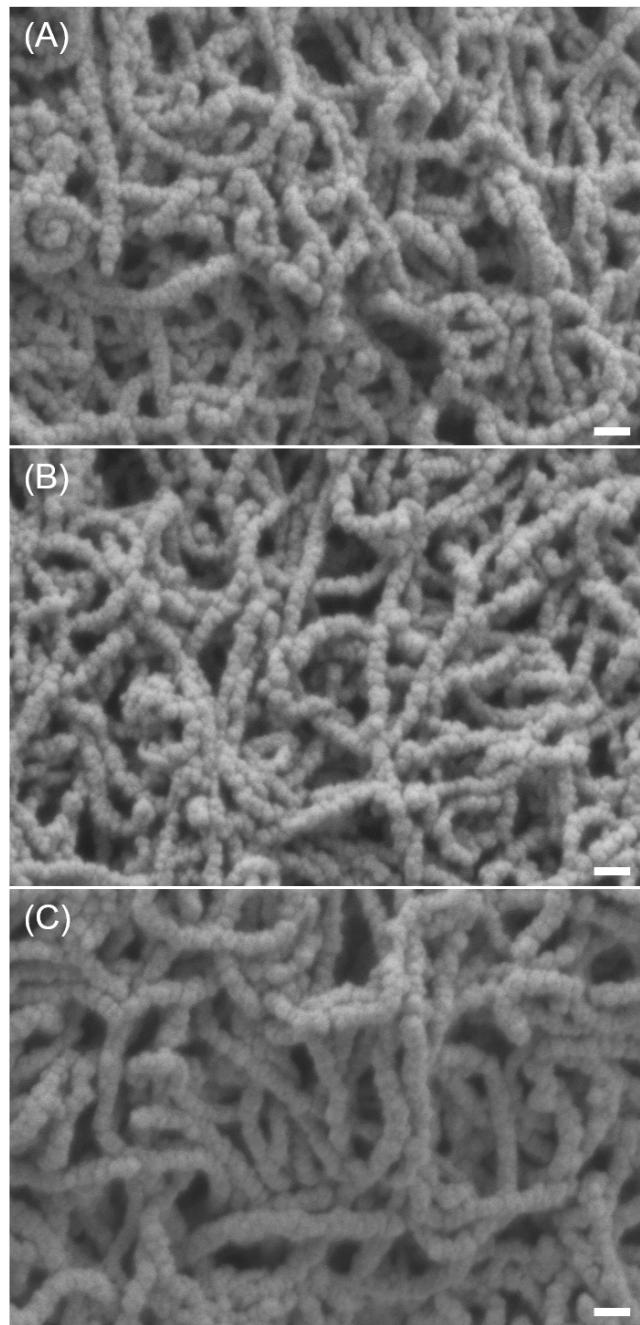


Fig. S6 SEM images of the PVP-CNT/ZIF-8s collected after the *in situ* synthesis of the ZIF-8 for (A) 15, (B) 60, and (C) 240 min. Scale bars: 100 nm.

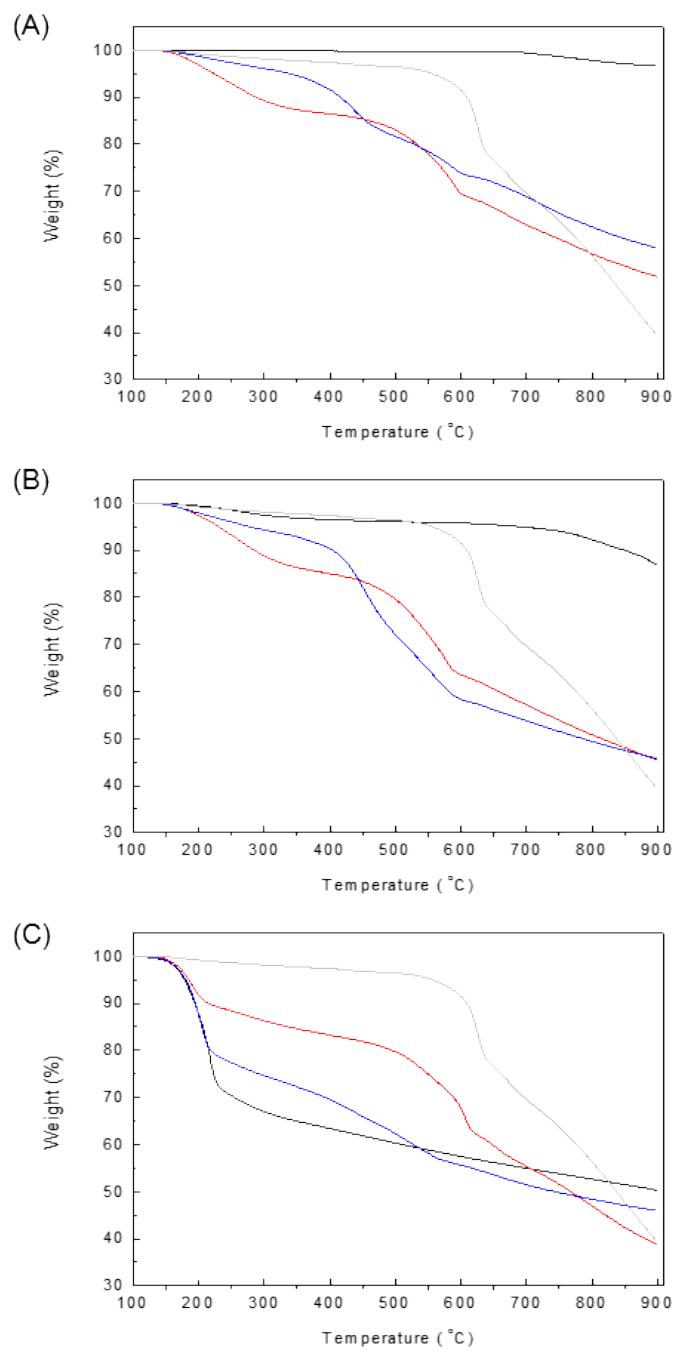


Fig. S7 TGA of the (A, blue line) PVP-CNT/ZIF-8, (A, red line) CNT/ZIF-8, (A, black line) CNT, (B, blue line) PVP-G/ZIF-8, (B, red line) G/ZIF-8, (B, black line) graphene, (C, blue line) PVP-GO/ZIF-8, (C, red line) GO/ZIF-8, and (C, black line) GO. TGA of the ZIF-8 (gray line) was expressed as a comparison.

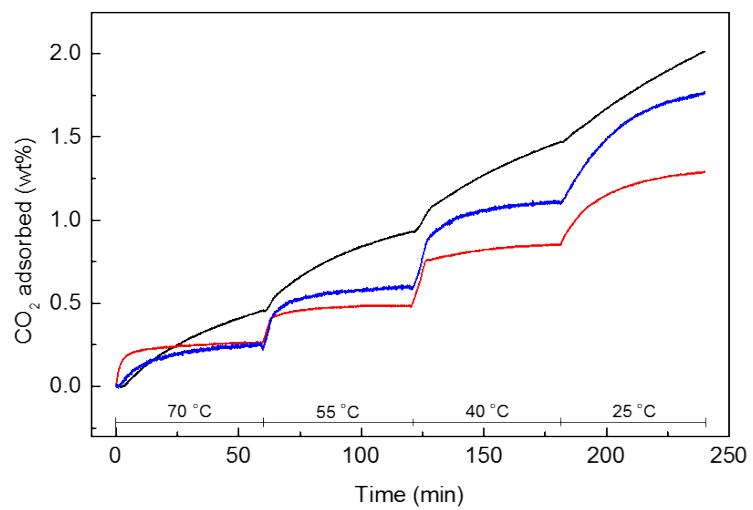


Fig. S8 TGA showing mass changes due to the adsorption and desorption of CO₂ gases obtained from the PVP-GO/ZIF-8 (blue line), GO/ZIF-8 (red line), and GO (black line) at the temperatures of 70, 55, 40 and 25 °C.