

Supporting information

Cathodic synthesis of Cu-catecholate metal-organic framework

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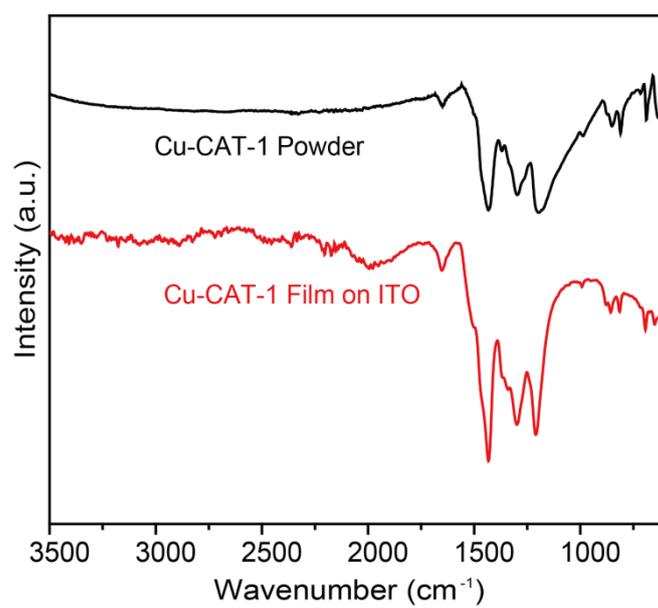


Figure S1. FT-IR spectra of the Cu-CAT-1 powder (black) and cathodically deposited Cu-CAT-1 film (red) on ITO substrate.

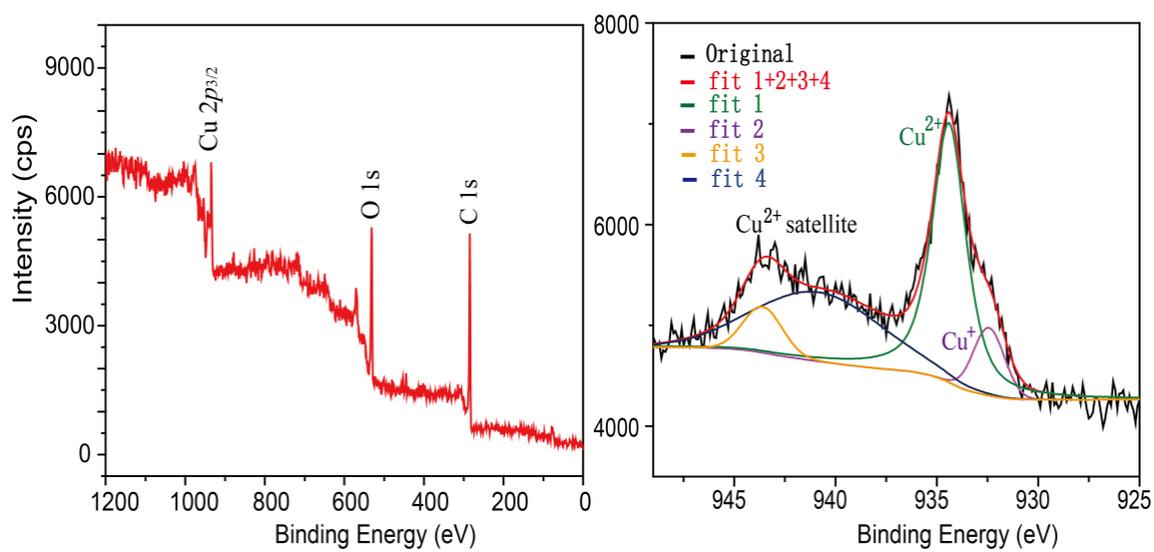


Figure S2. XPS spectra of Cu-CAT-1 film: a) full survey scan; b) high resolution spectrum of Cu 2p_{3/2} scan.

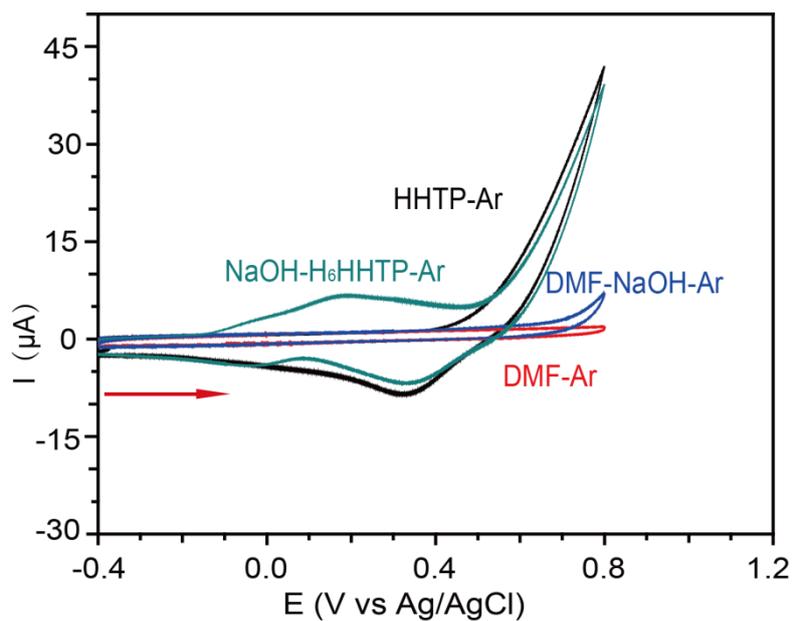


Figure S3. CV curves recorded for the Ar-saturated DMF background and H₆HHTP solutions with/without addition of NaOH (20 mM) on GC electrode at room temperature and at a scan rate of 100 mV/s.

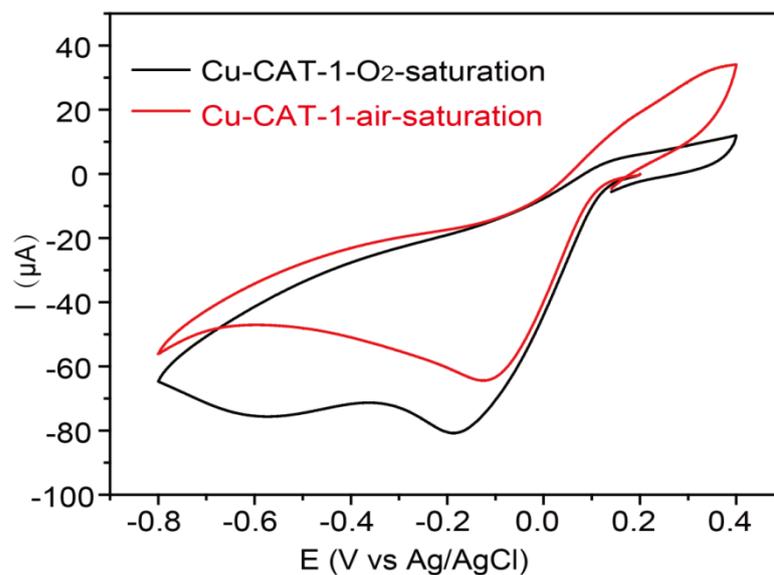


Figure S4. CV curves of air-saturated (red) and oxygen-saturated (black) Cu-CAT-1 precursor solutions containing $\text{Cu}(\text{NO}_3)_2$ (5 mM) and H_6HHTP (3.33 mM) measured on a glass carbon electrode at scan rates of 100 mV/s and with $(\text{NBu}_4)\text{PF}_6$ (10 mM) as the supporting electrolyte.

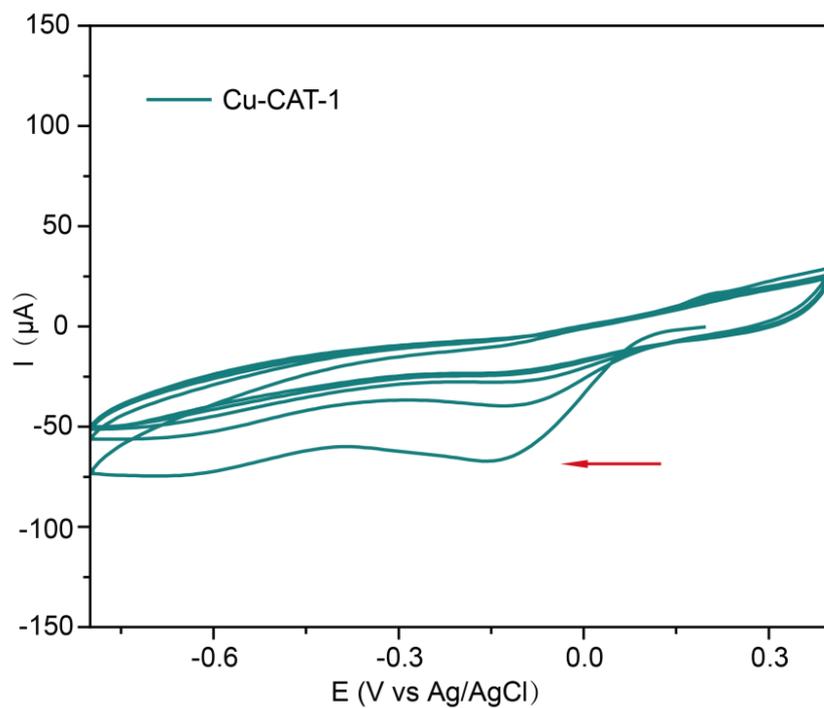


Figure S5. Consecutive CV curves of air-saturated Cu-CAT-1 precursor solutions containing $\text{Cu}(\text{NO}_3)_2$ (5 mM) and H_6HHTP (3.33 mM) measured on a glass carbon electrode at scan rates of 100 mV/s and with $(\text{NBU}_4)\text{PF}_6$ (10 mM) as the supporting electrolyte.

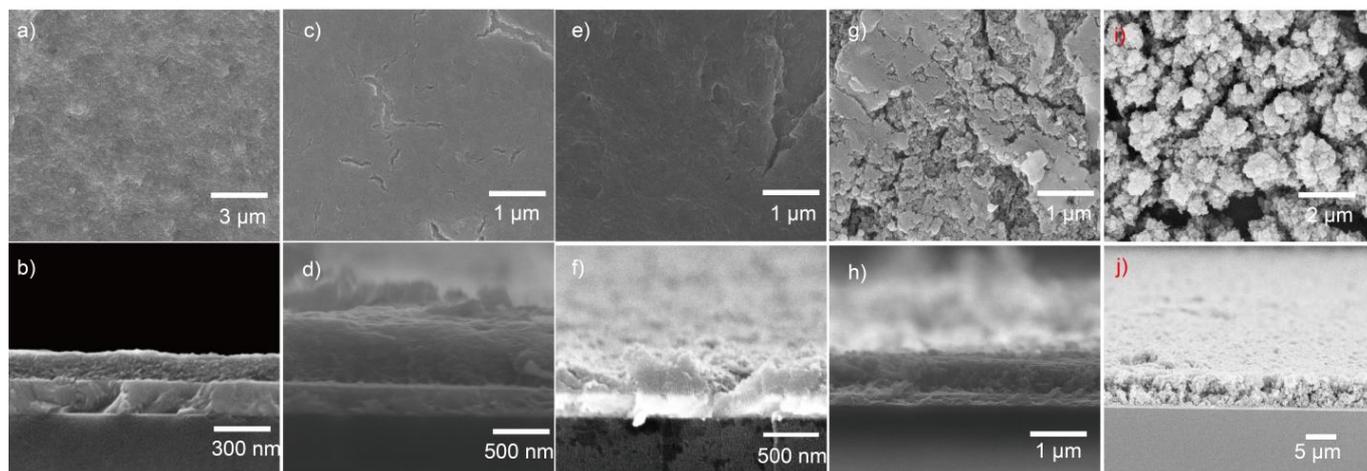


Figure S6. Top-view and cross-sectional SEM images of Cu-CAT-1 films on ITO substrate deposited at -0.1 V for 10 min from the supporting-electrolyte-free and air-saturated precursor solutions with $\text{Cu}(\text{NO}_3)_2$ concentration of a, b) 1mM, c, d) 2mM, e, f) 3mM, g, h) 4mM, and i, j) 5mM. The molar ratio of $\text{Cu}(\text{NO}_3)_2/\text{H}_6\text{HHP}$ is fixed to 3:2.

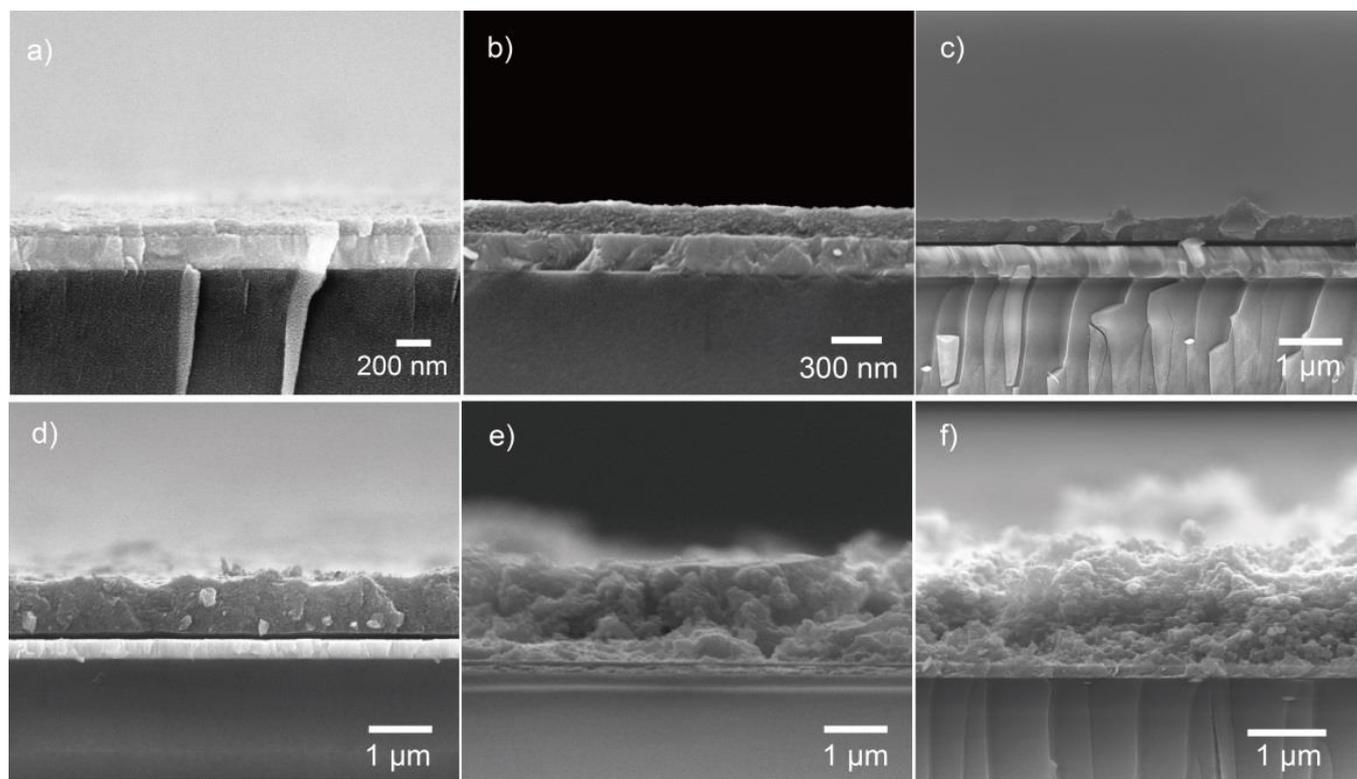


Figure S7. Cross-sectional SEM images of Cu-CAT-1 films on ITO substrate deposited at a) 0 V, b) -0.1 V, c) -0.2 V, d) -0.3 V, e) -0.4 V, and f) -0.5 V (versus Ag/AgCl) for 10 min. The air-saturated and supporting electrolyte-free precursor solution containing 1 mM $\text{Cu}(\text{NO}_3)_2$ and 0.66 mM H_6HHP was used for the cathodic synthesis.

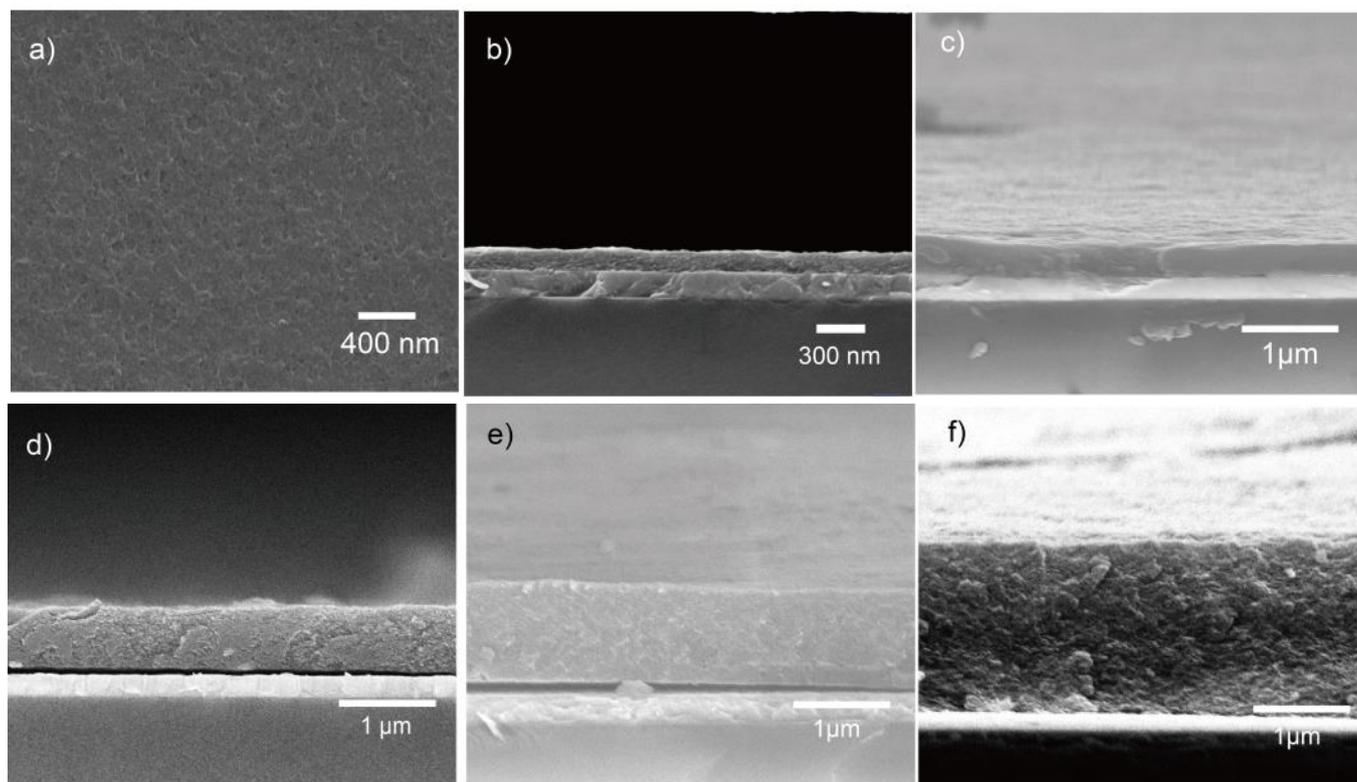


Figure S8. Top-view and cross-sectional SEM images of Cu-CAT-1 films on ITO substrate prepared by depositing at -0.1 V for a) 1, b) 10, c) 20, d) 30, e) 60, and f) 120 min from the air-saturated and supporting electrolyte-free precursor solution containing 1 mM $\text{Cu}(\text{NO}_3)_2$ and 0.66 mM H_6HHTP .