

Supporting Information

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Lithographic Deposition of Patterned Metal–Organic Framework Coatings Using a Photobase Generator**

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Supporting Information

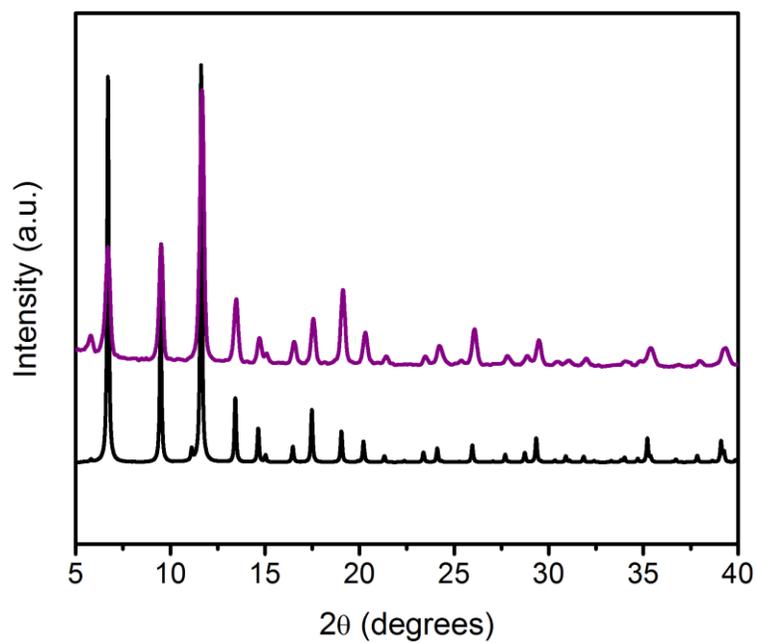


Figure S1. PXRD patterns of HKUST-1 isolated after PBG-assisted synthesis (purple) and simulated power pattern (black).

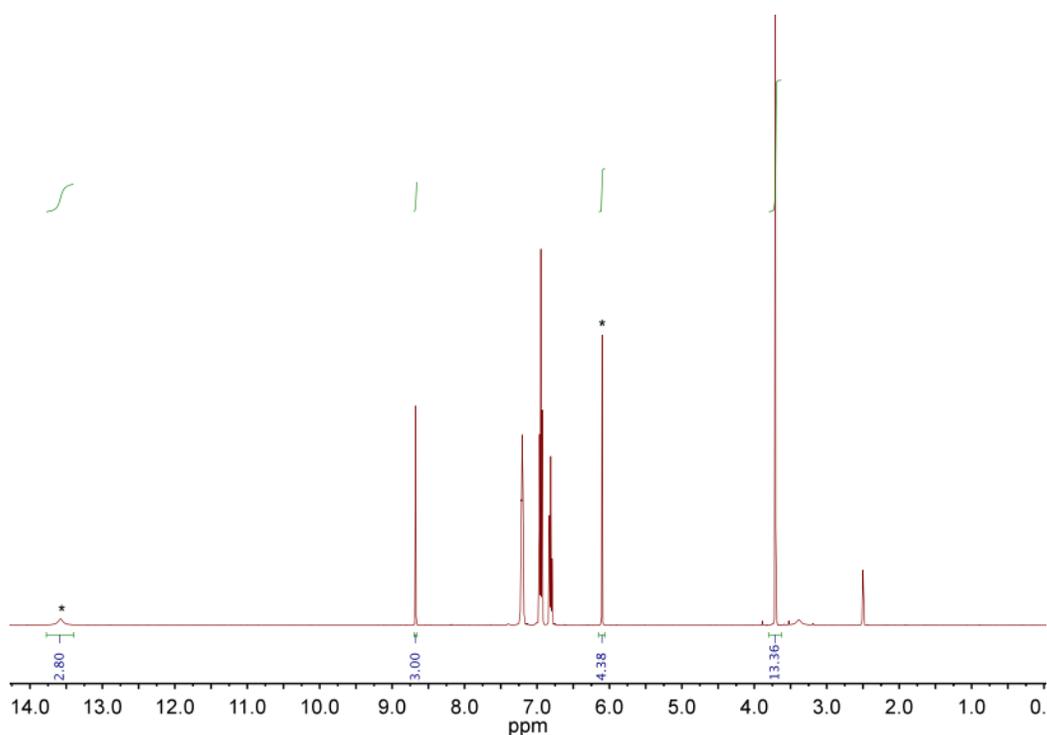


Figure S2. ^1H NMR spectrum ($\text{d}_6\text{-DMSO}$) of trimesic acid, NaBPh_4 , and trimethoxybenzene before irradiation. Asterisks indicate peaks expanded in Figure S3.

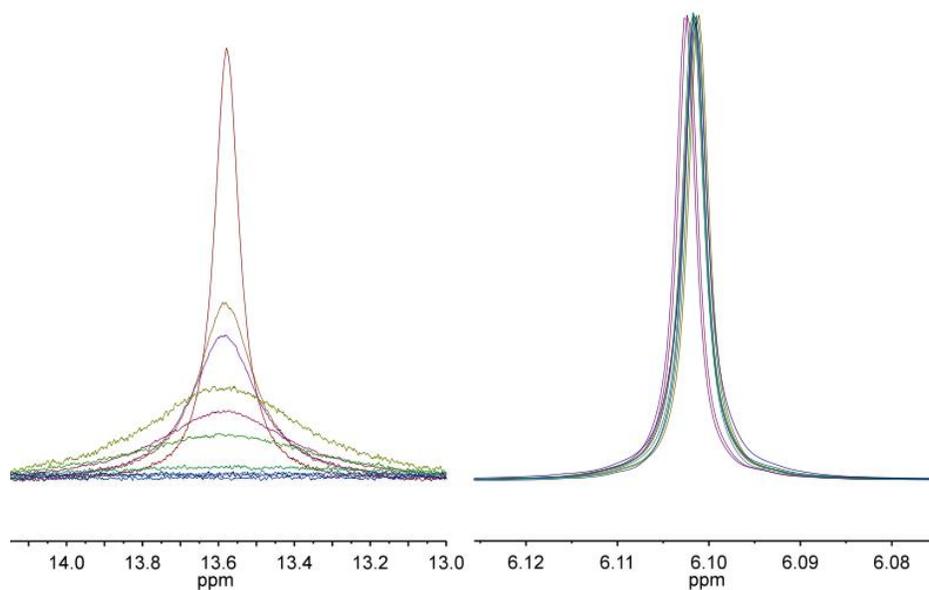


Figure S3. Expanded ¹H NMR spectra showing the evolution of the trimesic acid (COOH, left) and trimethoxybenzene (Ph-H, right) signal in d₆-DMSO at increasing irradiation time. Due to PBG-facilitated deprotonation the COOH-signal gradually disappears. The spectra correspond to the data in Table S1.

Table S1. Concentration of trimesic acid as a function of time in the presence of NaBPh₄ and trimethoxybenzene (internal standard) at room temperature.

| Time (s) | Trimesic Acid Integral / Trimethoxy Benzene Integral | [Trimesic Acid] (mmol) |
|----------|--|------------------------|
| 0 | 0.673 | 0.259 |
| 83 | 0.527 | 0.203 |
| 122 | 0.489 | 0.189 |
| 189 | 0.327 | 0.126 |
| 245 | 0.311 | 0.121 |
| 388 | 0.209 | 0.0809 |
| 1014 | 0.061 | 0.0235 |
| 1467 | 0.033 | 0.0126 |
| 2652 | 0.012 | 0.0047 |
| 5268 | 0.023 | 0.0088 |

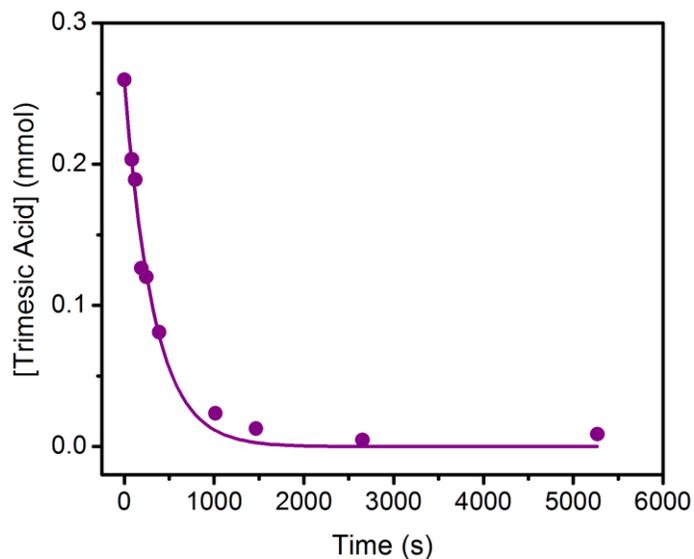


Figure S4. Concentration of trimesic acid as a function of irradiation time in the presence of NaBPh₄ at room temperature. Concentration was measured via ¹H NMR spectroscopy using 1,3,5-trimethoxybenzene as an internal standard. The solid line represents an exponential decay fit of the experimental data with equation $y = (0.260 \pm 0.009)e^{-t/(324 \pm 25)}$ and $R^2 = 0.989$.

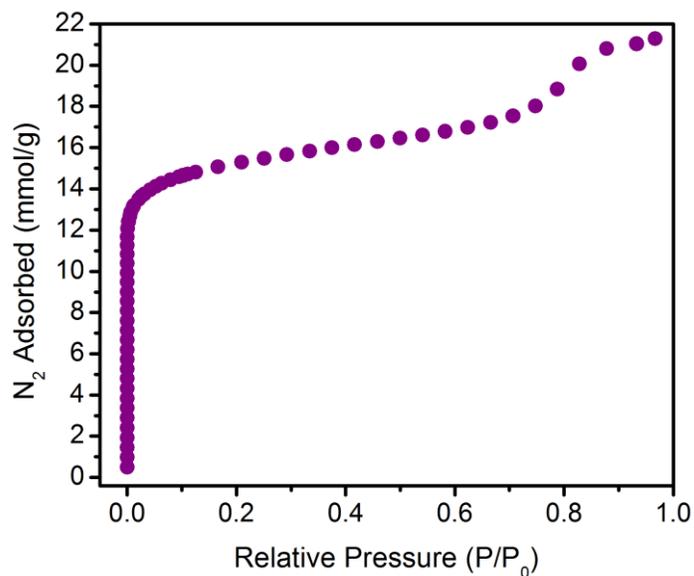


Figure S5. N₂ adsorption isotherm at 77 K of HKUST-1 formed via photobase generation.

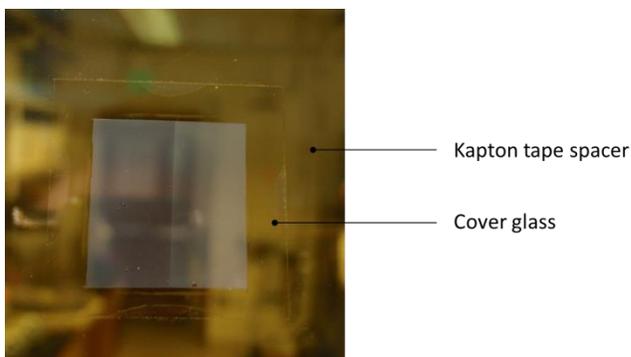


Figure S6. Transparency test of the cover glass substrates. The photograph shows the result of irradiating NaBPh₄-containing HKUST-1 synthesis solution sandwiched in between a microscope cover glass and a glass support plate. During irradiation, the region on the left was covered with an additional cover glass, while the region on the right was irradiated as shown. While the extra cover glass absorbs part of the light needed to activate NaBPh₄, as is evidenced by the thinner and more transparent HKUST-1 layer on the left, sufficient transmission to effectuate metal-organic framework formation is evident in both regions.

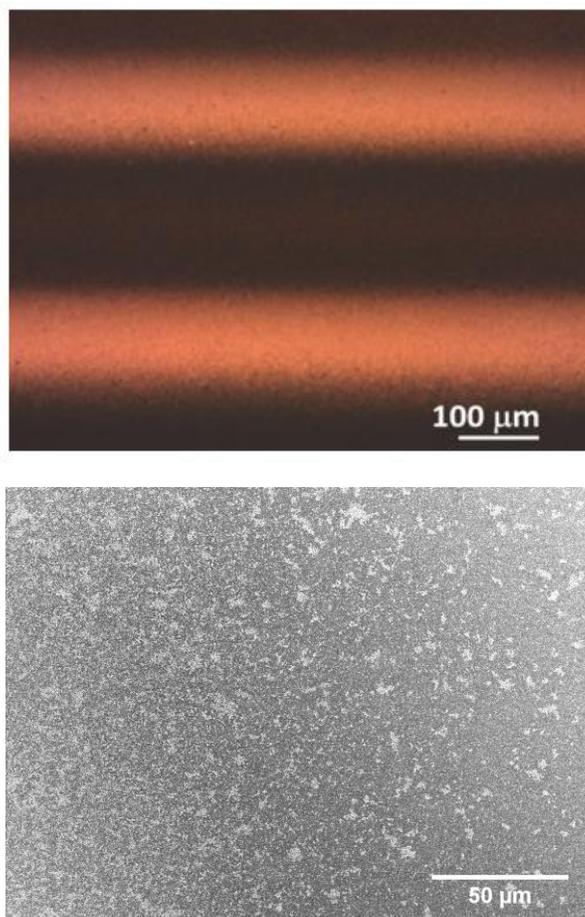


Figure S7. (top) optical image of patterned HKUST-1 film after sputter coating with gold to enhance contrast. (bottom) SEM image of line edge of pattern showing gradual decrease in metal-organic framework coating (light areas) from left to right consistent with profilometry data.



Figure S8. Photograph of the deposited metal-organic framework coatings HKUST-1 + HPA (Zone 1) and HKUST-1 (Zone 2).

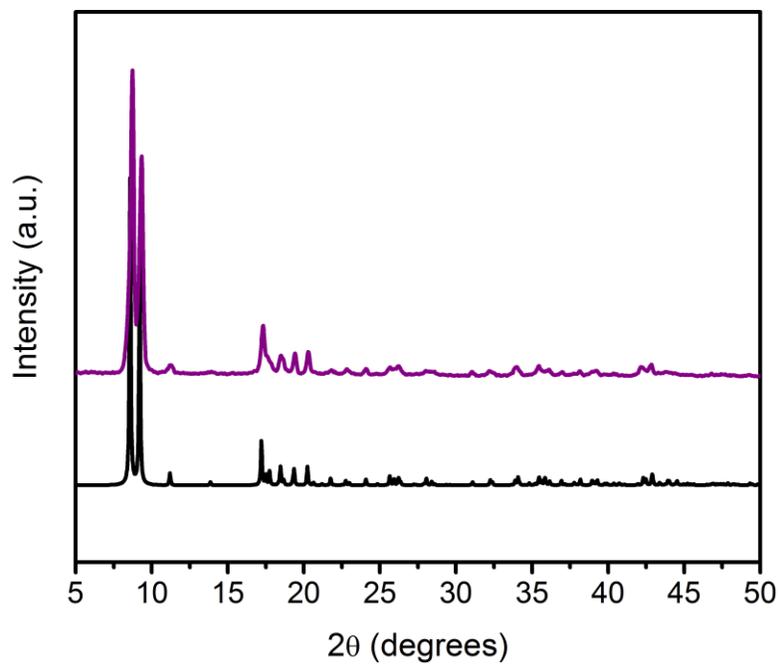


Figure S9. PXRD patterns of Cu₂(trans-1,4,-chdc)₂ after PBG-assisted synthesis (purple) and simulated powder pattern (black).

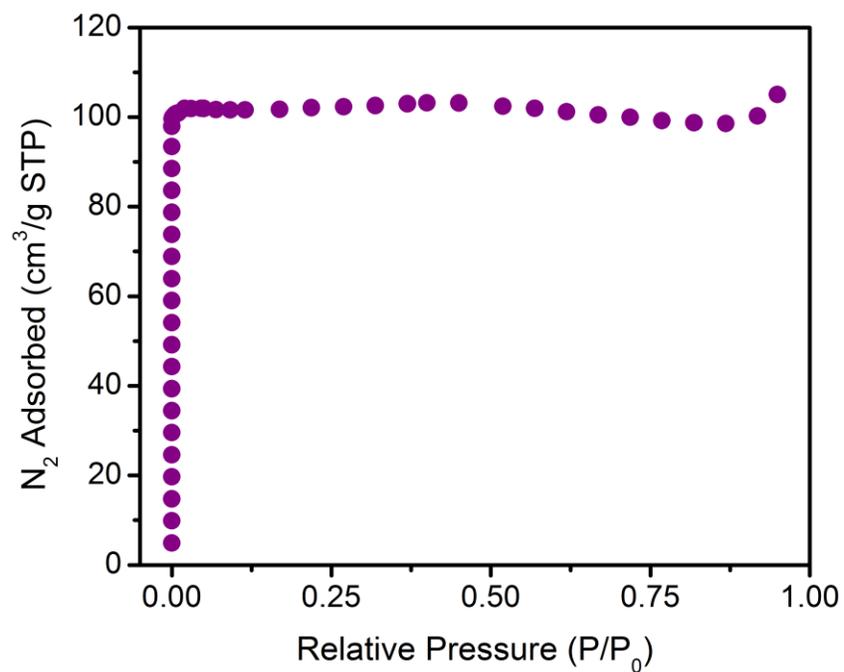


Figure S10. N₂ adsorption isotherm at 77 K of Cu₂(trans-1,4,-chdc)₂ formed via photobase generation.

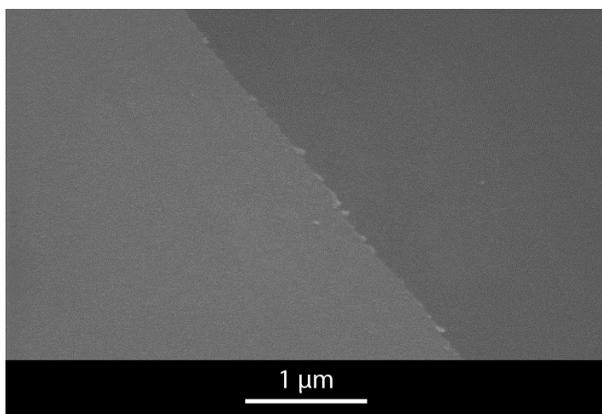


Figure S11. SEM image of a photodeposited $\text{Cu}_2(\text{trans-1,4-chdc})_2$ coating deposited on a bare glass surface after intentional scratching. The metal-organic framework layer and the exposed substrate appear as respectively the light and dark grey part of the micrograph.