Insights into inorganic buffer layer-assisted in situ fabrication of MOF films with controlled microstructures

Yi Liu, a Ryotaro Matsuda, a,b,c Shinpei Kusaka, d Akihiro Hori, b Yunsheng Ma, b and Susumu Kitagawa, d

a State Key Laboratory of Fine Chemicals, School of Chemical Engineering, Dalian University of Technology, 116024, Dalian, China
b Department of Chemistry and Biotechnology, School of Engineering, Nagoya University, Furo-cho, Chikusa-ku, 464-8603, Nagoya, Japan
c PRESTO, Japan Science and Technology Agency (JST), 4-1-8 Honcho, 332-0012, Kawaguchi, Japan
d Institute for Integrated Cell-Material Sciences (WPI-iCeMS), Kyoto University, Katsura, Nishikyo-ku, 615-8510, Kyoto, Japan

Supporting Information

S1
SI-1 EDXS pattern of prepared Co-Al-CO$_3$ HTlc buffer layer

Fig. S1 EDXS pattern of prepared Co-Al-CO$_3$ HTlc buffer layer. a) The SEM image; element mappings of b) Co and c) Al; d) elemental composition analysis.

SI-2 EDXS analysis of prepared Co-Al HTlc powders

Fig. S2 EDXS pattern of collected Co-Al-CO$_3$ HTlc powder samples. a) The SEM image; element mappings of b) Co and c) Al; d) elemental composition analysis.
SI-3 XRD pattern of collected Co-Al HTlc powders

Fig. S3 XRD pattern of collected Co-Al HTlc powders. Synthetic conditions were identical to those of Co-Al HTlc buffer layers.

SI-4 FT-IR spectra of Co-Al HTlc powders

Fig. S4 The FT-IR pattern of collected Co-Al HTlc powders.
SI-5 Characterization of ZIF-7 nanocrystals synthesized with ZnI\(_2\) as the zinc source

Fig. S5 The a) SEM image and b) XRD pattern of ZIF-7 nanocrystals synthesized with ZnI\(_2\) as the zinc source.

SI-6 Characterization of ZIF-7 films synthesized with different zinc sources

Fig. S6 XRD patterns of ZIF-7 films prepared with a) ZnCl\(_2\), b) ZnBr\(_2\) and c) ZnI\(_2\) as zinc sources.
SI-7 Characterization of collected Mg-Al HTlc powders

**Fig. S7** a) SEM, b) XRD and c) EDXS pattern of collected Mg-Al-CO$_3$ HTlc powder samples.

SI-8 HKUST films *in situ* synthesized on Zn-Al HTlc-modified $\gamma$-Al$_2$O$_3$ substrates

**Fig. S8** SEM images of HKUST-1 films grown on a) bare and b) Zn-Al HTlc-modified porous $\gamma$-Al$_2$O$_3$ substrates.