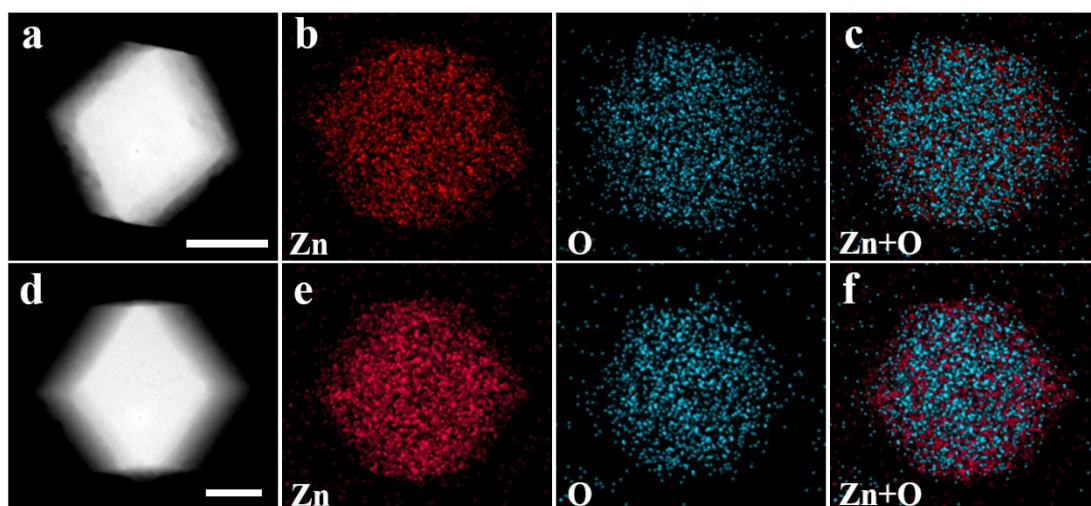


## **MOF-on-MOF heterostructures with core-shell and core-satellite structures via controllable nucleation of guest MOF**

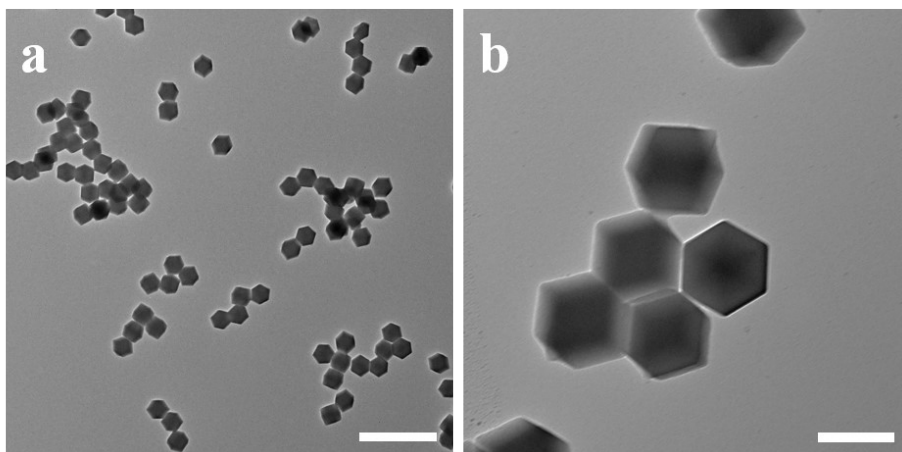
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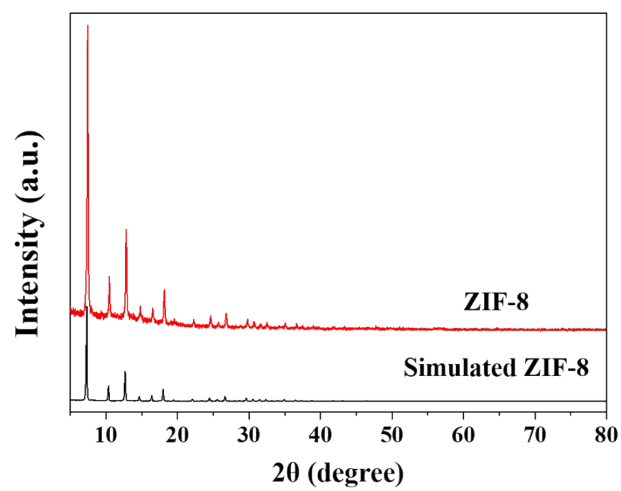
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**Fig. S1** (a) STEM image, and (b and c) elemental mapping images of ZIF-90; (d) STEM image, and (e and f) elemental mapping images of ZIF-90@ZIF-8-A. The scale bars are 100 nm.



**Fig. S2** (a and b) TEM images of ZIF-8. Scale bars are 1  $\mu\text{m}$  (a) and 200 nm (b).



**Fig. S3** XRD patterns of ZIF-8.