Optimized encapsulation of $CsPbBr_3$ nanocrystals in metal-organic framework by improved synthesis

Yongqiang Ji[a], Luyang Tong[a], Kai An[a], Le Li[b], Na Liu[c], Jiewen Wei[d], Tong Wang[d], Lixia Bao[e], Xiaobo He[a], Tinglu Song[f,*], Fan Xu[g,*]

[a] Institute of Physics, Henan Academy of Sciences, Zhengzhou 450046, China

[b] Shaanxi Key Laboratory of Industrial Automation, School of Mechanical Engineering, Shaanxi University of Technology, Hanzhong 723001, China

[c] Faculty of Materials Science, MSU-BIT University, Shenzhen, 518172 China

[d] Department of Chemistry and Centre for Processable Electronics, Molecular Sciences Research Hub, Imperial College London, London W12 0BZ, UK

[e] Analysis & Testing Center, Beijing Institute of Technology, Beijing 102488, China

[f] Experimental Center of Advanced Materials, School of Materials Science and Engineering, Beijing Institute of Technology, Beijing 100081, China

[g] Shenzhen Institute for Advanced Study, University of Electronic Science and Technology of China, Shenzhen 518110, China

Corresponding Authors: song@bit.edu.cn (T.S.); xufan@pku.edu.cn (F.X.)

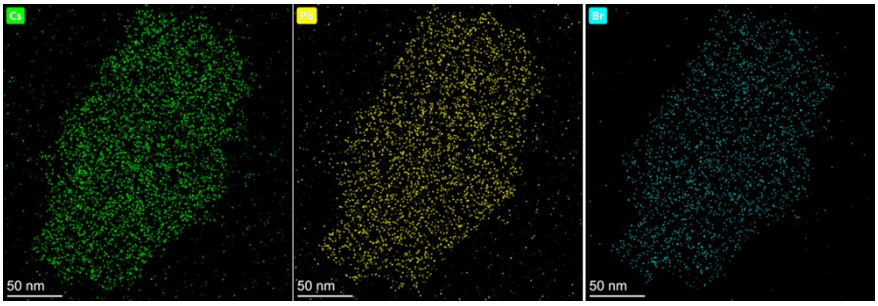

Figure S1. TEM-EDX results of the fabricated $CsPbBr_3$ NCs.

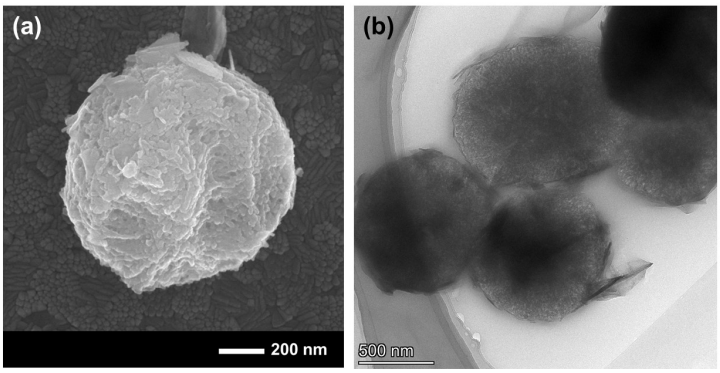

Figure S2. (a) SEM and (b) TEM images of MIL-53 (Al).

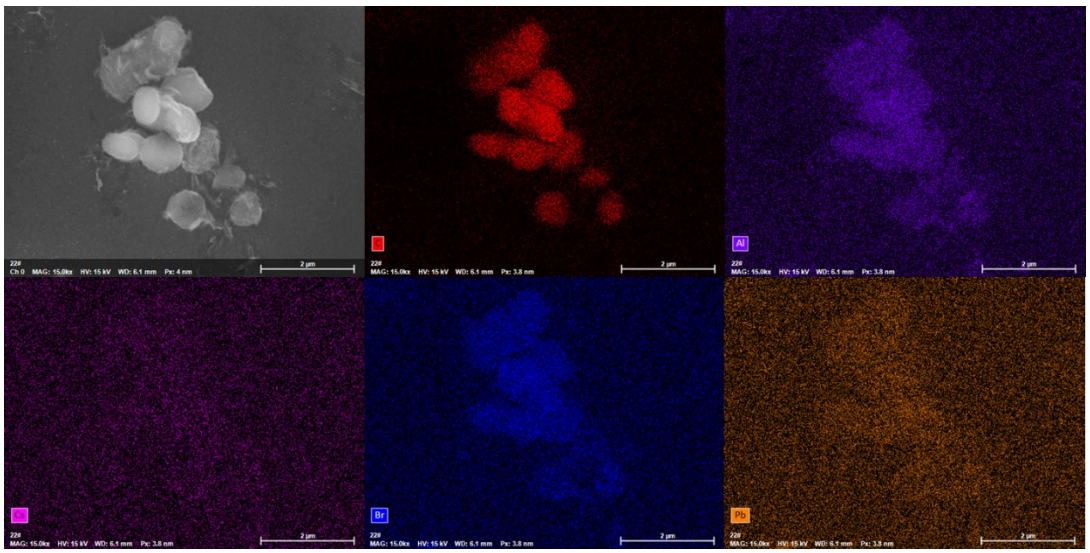

Figure S3. SEM-EDX results of one-step encapsulated $CsPbBr_3$@MOF composites.

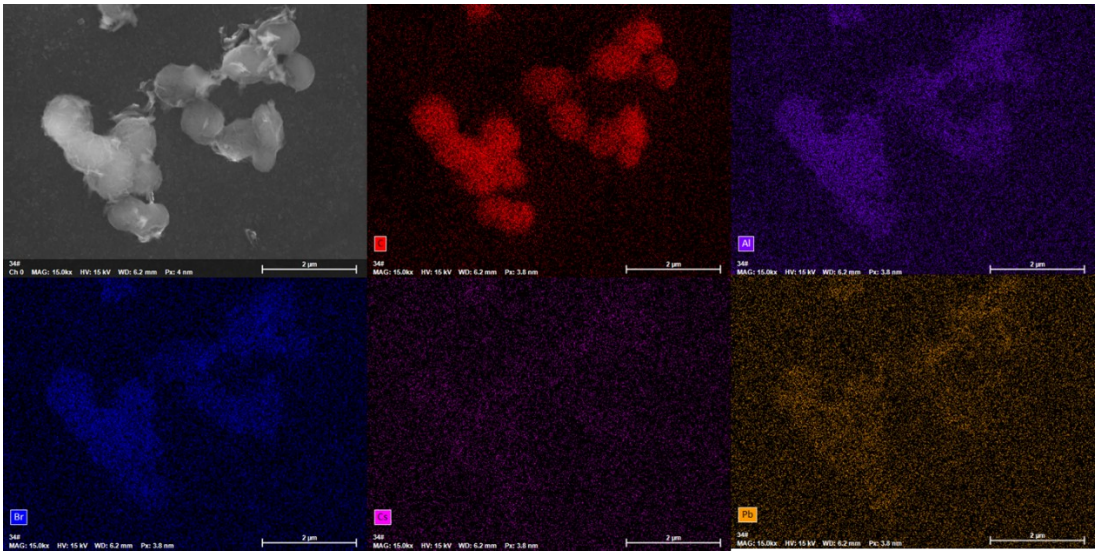

Figure S4. SEM-EDX results of two-step encapsulated CsPbBr3@MOF composites.

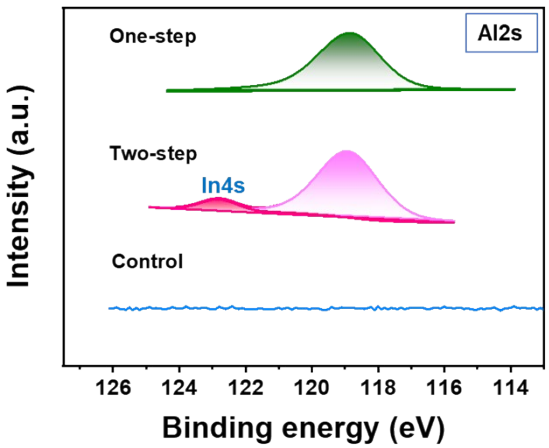

Figure S5. XPS results of Al 2s for control, one-step, and two-step samples, respectively.

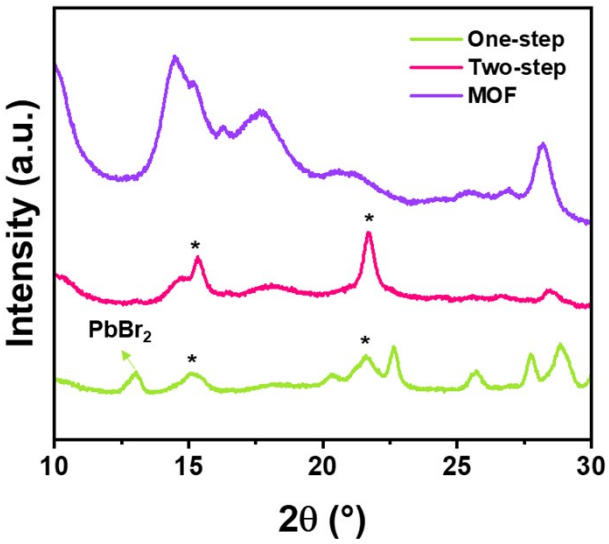

Figure S6. XRD results of MIL-53 (Al), one-step and two-step encapsulated $CsPbBr_3$ NCs@MOF samples, respectively. The asterisks represent diffraction peaks of $CsPbBr_3$ NC.

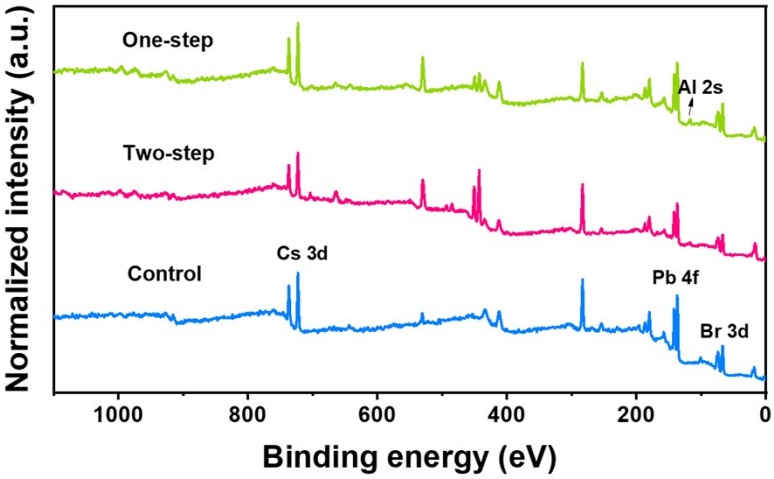

Figure S7. The full XPS survey spectra of control, one-step, and two-step $CsPbBr_3$@MOF samples, respectively.

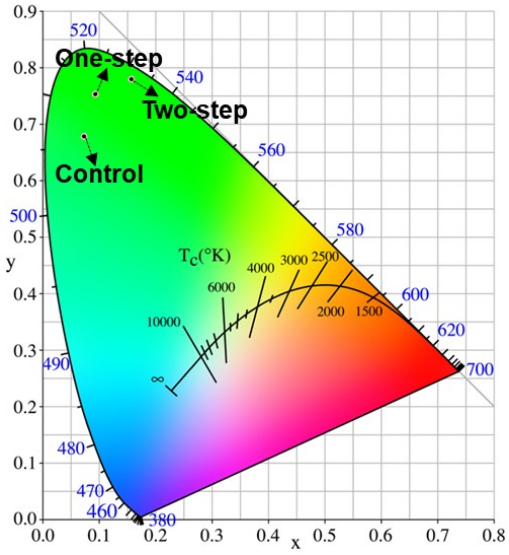

Figure S8. CIE chromaticity coordinates of control, one-step, and two-step samples, respectively.

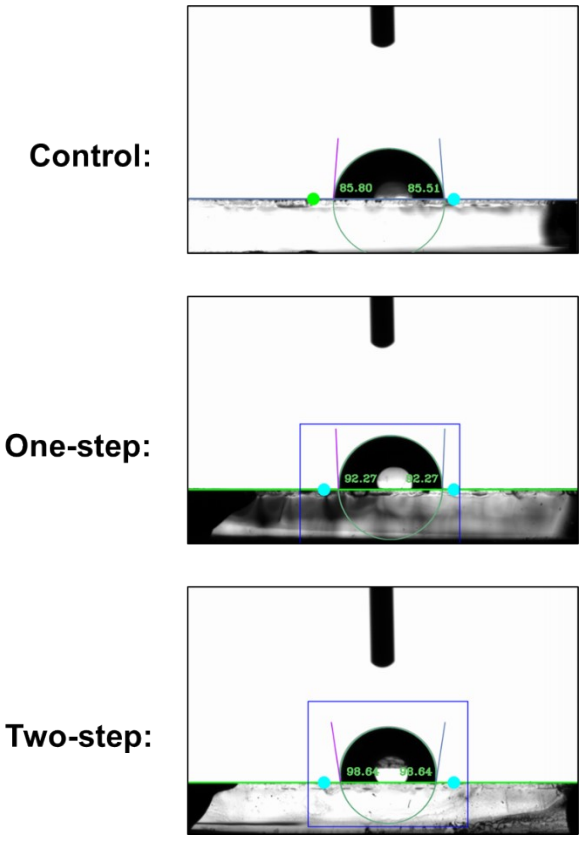

Figure S9. Water contact angle results of control, one-step, and two-step samples, respectively.

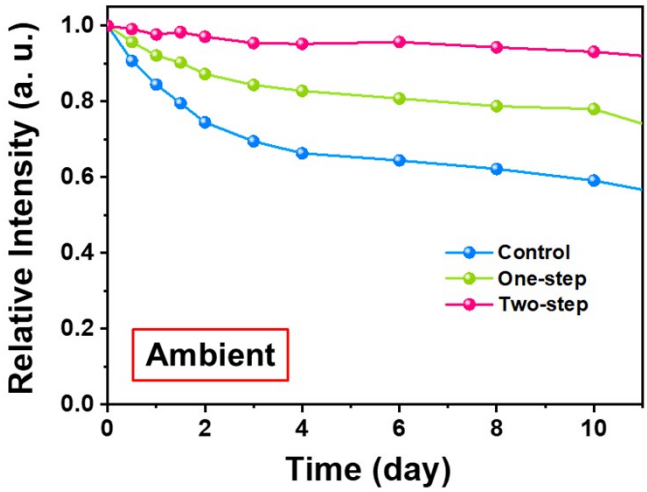

Figure S10. Steady-state PL evolution of control, one-step and two-step sample films under ambient conditions.

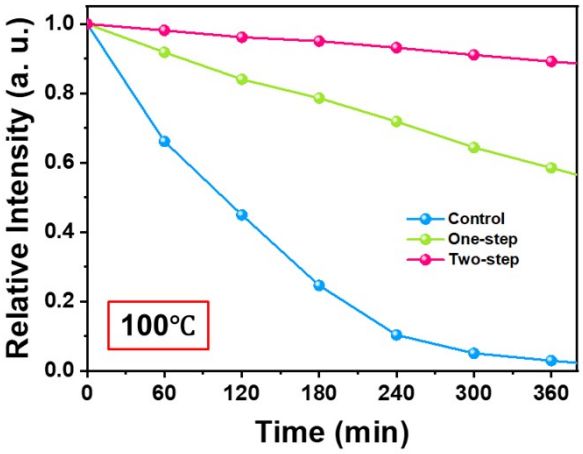

Figure S11. Steady-state PL evolution of control, one-step and two-step sample films at 100 ℃.

Table S1. The fitted data for TRPL curves.

	A_1	t_1 (ns)	A_2	t_2 (ns)	t_{ave} (ns)
Control	601.29	14.86	362.55	64.98	51.20
One-step	23111.44	8.17	658.85	55.76	15.92
Two-step	756.37	26.13	275.51	111.53	78.10