Supporting Information

Solar-light-triggered regenerative adsorption removal of styrene by silver nanoparticles incorporated metal–organic frameworks

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Fig. S1 Powder XRD patterns of pure UiO-66 and Ag/UiO-66 adsorbents with Ag loading of

0.5, 1, 2 and 3 wt%, respectively.



Fig. S2 TEM images of pure UiO-66.



Fig. S3 The corresponding particle size distribution histograms of the 3 wt% Ag/UiO-66.



Fig. S4 Experimental styrene uptakes and corresponding fit to the pseudo-first order kinetic model and second order kinetic model of 0.5 wt % Ag/UiO-66.



Fig. S5 Experimental styrene uptakes and corresponding fit to the pseudo-first order kinetic

model and second order kinetic model of 1 wt % Ag/UiO-66.



Fig. S6 Experimental styrene uptakes and corresponding fit to the pseudo-first order kinetic

model and second order kinetic model of 3 wt % Ag/UiO-66.



Fig. S7 The breakthrough curves of styrene on pure UiO-66 and the corresponding desorption curves by heating at 75 °C.

The complete breakthrough time could extend to 3015 min and the equilibrium adsorption capacity of styrene on pure UiO-66 estimated was 561.3 mg/g. The styrene desorption capacities were 549.8 mg g⁻¹ after heating for 2500 min at 75 °C, implying that the adsorbed styrene could be almost completely desorbed from the surface of UiO-66.



Fig. S8 FT-IR spectra of styrene in the range of 4000-650 cm⁻¹.



Fig. S9 FT-IR spectra of pure UiO-66 and 2 wt% Ag/UiO-66 for adsorbed pyridine.



Fig. S10 In-situ DRIFTS spectra of pure UiO-66 in the range of 3685-3580 cm⁻¹ (a), 3100-2960 cm⁻¹ (b), 1640-1390 cm⁻¹ (c) and 1000-770 cm⁻¹ (d) during styrene adsorption at

different times in the range of 0-90 min.

Sample	adsorption capacity (mg g ⁻¹)	desorption efficiency (%)		
UiO-66	569.39	18.1		
0.5 wt% Ag/UiO-66	489.14	22.3		
1 wt% Ag/UiO-66	432.54	32.4		
2 wt% Ag/UiO-66	364.58	62.1		
3 wt% Ag/UiO-66	323.57	85.3		

Table S1 The saturated adsorption capacity and the desorption efficiency within 875 min of irradiation of UiO-66 and Ag/UiO-66

Table S2 Acidity characteristics of UiO-66 and 2 wt% Ag/UiO-66

Adsorbent	C _B (umol g ⁻¹)	C _L (umol g ⁻¹)	C _{total} (umol g ⁻¹)
UiO-66	33.6	193.6	227.2
2 wt% Ag/UiO-66	38.2	164.0	202.2

Sample –	The peak temperature T_p (K) at different heating rates (K min ⁻¹)				E_d	
	3	4	5	6	7	(kJ mol ⁻¹)
UiO-66	414	426	434	442	448	31.35
0.5% wt Ag/UiO-66	412	424	433	440	446	30.92
1% wt Ag/UiO-66	409	421	429	437	444	29.82
2% wt Ag/UiO-66	407	419	428	436	442	29.01
3% wt Ag/UiO-66	405	417	427	434	441	27.96

Table S3 Desorption peak temperatures of styrene at different heating rates and desorptionactivation energies (E_d) of styrene on UiO-66 and Ag/UiO-66.