Supporting Information

Magnetically Recyclable Self-Assembled Thin Films for Highly Efficient Water Evaporation by Interfacial Solar Heating

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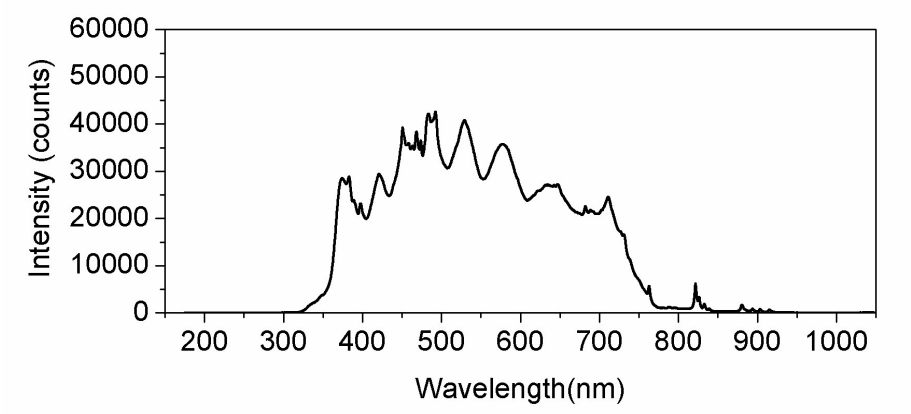

Figure S1 The spectrum of the xenon lamp used in experiment.

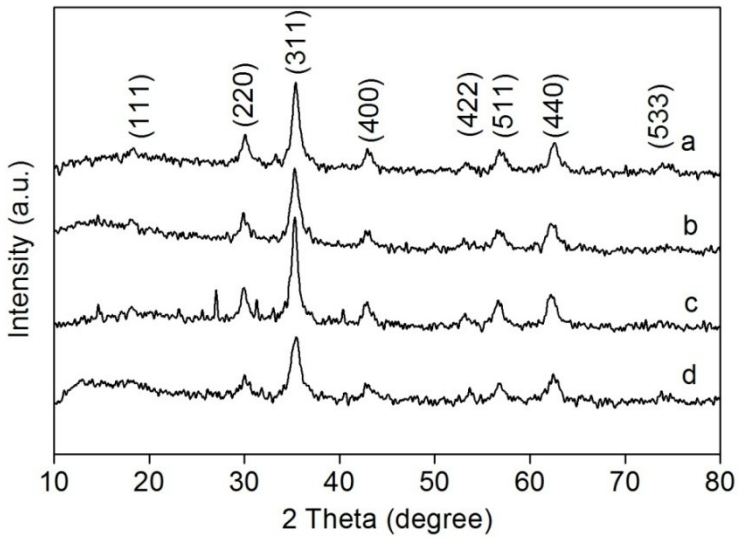

Figure S2 XRD patterns of (a) Fe_3O_4, (b) $MnFe_2O_4$, (c) $ZnFe_2O_4$,and (d) $CoFe_2O_4$ microspheres.

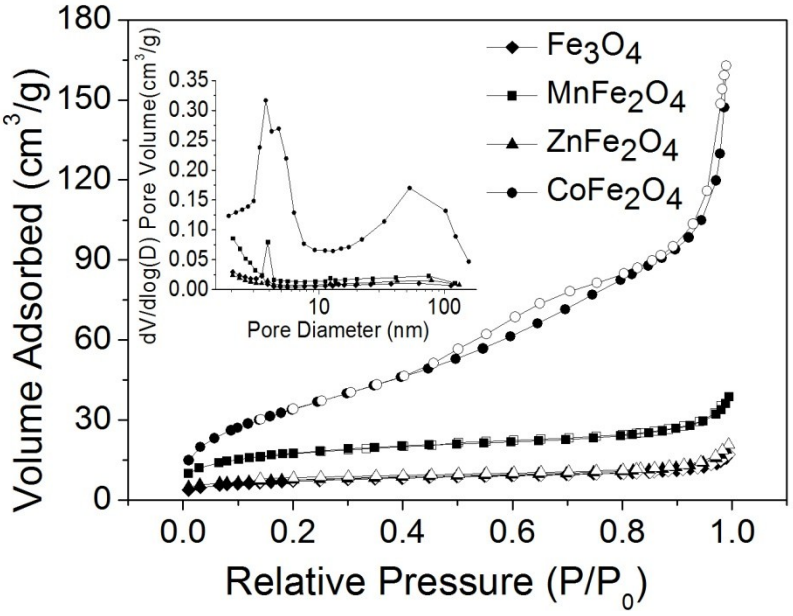

Figure S3 N_2 adsorption-desorption isotherms and the corresponding pore-size distribution curves (inset) of Fe_3O_4, $MnFe_2O_4$, $ZnFe_2O_4$ and $CoFe_2O_4$ microspheres.

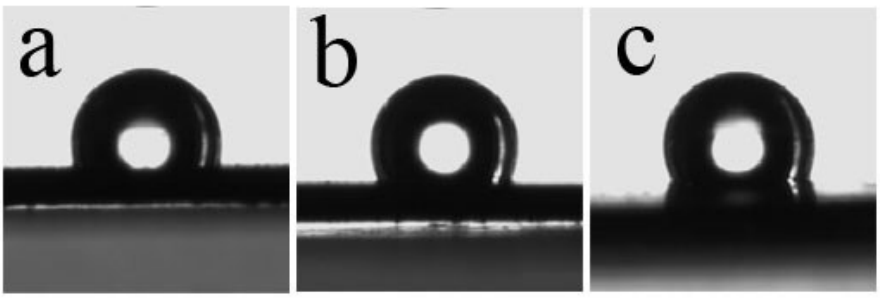

Figure S4 The contact angle of (a) $MnFe_2O_4$, (b) $ZnFe_2O_4$, and (c) $CoFe_2O_4$.

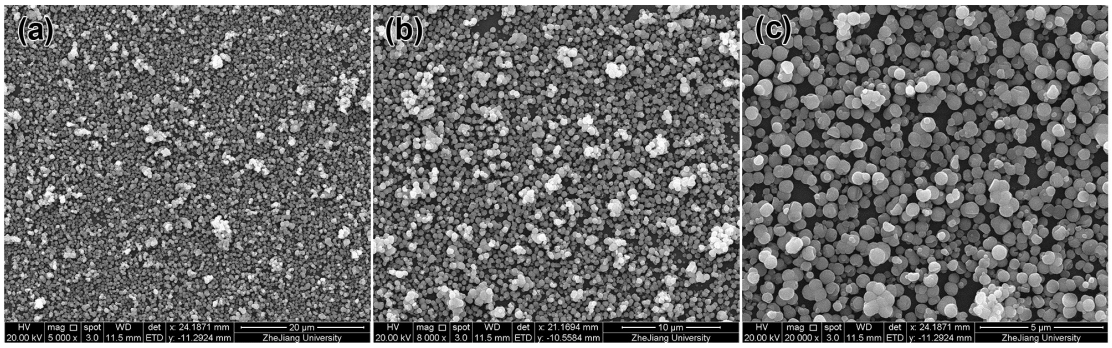

Figure S5 SEM of the floating thin film.

Figure S6 The contact angle and adhesive property of Fe_3O_4 microspheres after 10 cycles.

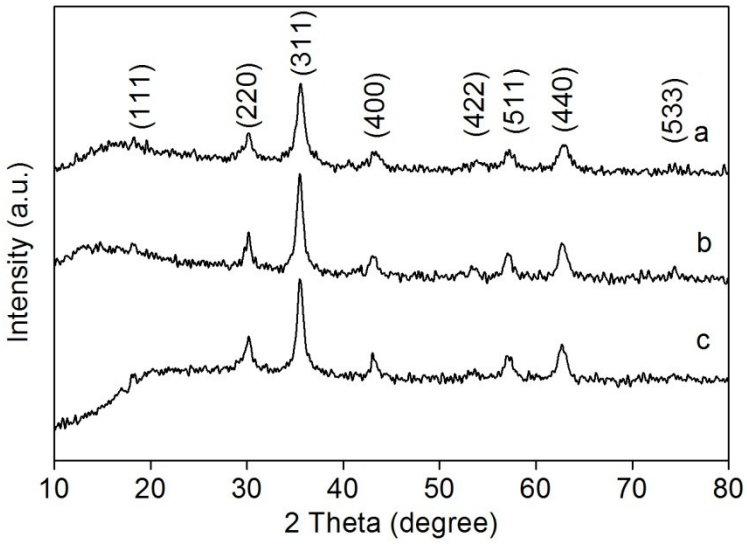

Figure S7 XRD patterns of Fe_3O_4 microspheres after (a) 4 cycles, (b) 6 cycles, and 10 cycles.

Table S1 BET surface areas, total pore volume, and average pore diameters of these four magnetic microspheres.

Sample	BET surface area (m^2/g)	Total pore volume [a] (cm^3/g)	Average pore diameter [b] (nm)
Fe_3O_4	25.65	0.021	6.4
$MnFe_2O_4$	63.47	0.049	5.6
$ZnFe_2O_4$	27.02	0.025	8.3
$CoFe_2O_4$	129.08	0.259	6.9

[a] BJH Desorption cumulative volume of pores between the pore diameter of 1.7 and 300 nm.

[b] BJH Desorption average pore diameter.

Table S2 The proportion of light absorption in different spectrum regions

Sample	Total absorption	UV (< 400 nm)	Visible (400-760 nm)	Infrared (> 760 nm)
Solar spectrum	100%	3.40%	40.86%	55.74%
Fe_3O_4	86.05%	2.98%	34.63%	48.44%
$MnFe_2O_4$	82.20%	2.96%	33.42%	45.83%
$ZnFe_2O_4$	88.78%	3.04%	35.69%	50.04%
$CoFe_2O_4$	83.86%	2.98%	34.19%	46.69%

Table S3 The zero-order kinetic equations and evaporation efficiencies of different water evaporation processes.

Process	Zero-order kinetic equations	Water evaporation efficiency (k, L/m^{2}min)	R^2
1	y= 0.02362x-0.4215	0.02362	0.9886
2	y= 0.02973x-0.2960	0.02973	0.9956
3	y= 0.03624x-0.5078	0.03624	0.9893
4	y= 0.05159x-0.1683	0.05159	0.9997
5	y= 0.05079x-0.0399	0.05079	0.9995
6	y= 0.05388x-0.0792	0.05388	0.9998
7	y= 0.05731x-0.0470	0.05731	0.9998
8	y= 0.04227x+0.0423	0.04227	0.9996
9	y= 0.04653x-0.0356	0.04653	0.9995
10	y= 0.04941x-0.1878	0.04941	0.9993

* Water evaporation by different processes:

(1#) water itself evaporation under simulated solar light

(2#) 150 mg Fe_3O_4 microspheres uniformly dispersed in water

(3#) 150 mg Fe_3O_4 microspheres float on water surface without formation of a thin film

(4#) 150 mg Fe_3O_4 microspheres float on water surface with formation of a thin film

(5#) 50 mg Fe_3O_4 microspheres float on water surface with formation of a thin film

(6#) 300 mg Fe_3O_4 microspheres float on water surface with formation of a thin film

(7#) 600 Fe_3O_4 microspheres float on water surface with formation of a thin film

(8#) 150 mg $MnFe_2O_4$ microspheres float on water surface with formation of a thin film

(9#) 150 mg $ZnFe_2O_4$ microspheres float on water surface with formation of a thin film

(10#) 150 mg $CoFe_2O_4$ microspheres float on water surface with formation of a thin film