

In-situ metal-ion-incorporated photothermal GO films with adjustable temperature range for personal thermal management

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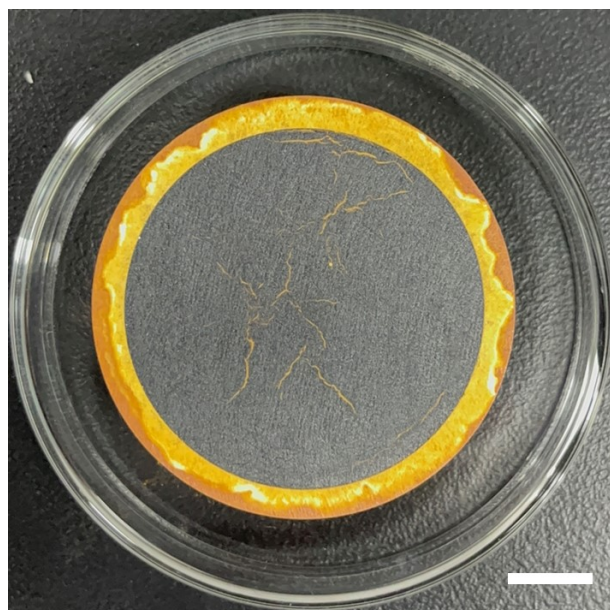


Fig. S1 The optical photograph of GO-Fe-0.4 film. Scale bar is 1 cm.

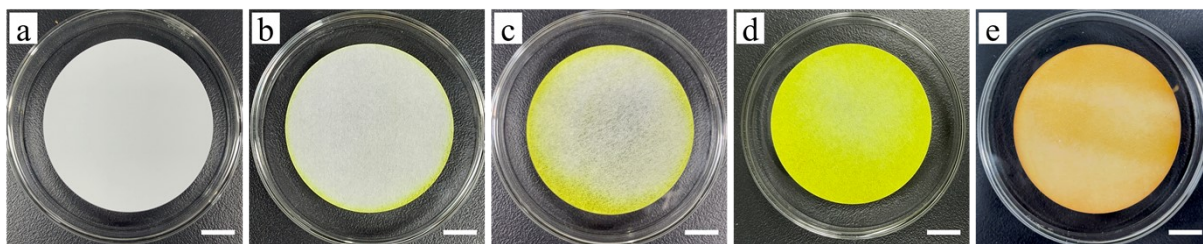


Fig. S2 Optical photographs of CNCA substrate films soaked in different concentrations of iron ion solutions after drying. Scale bars are 1 cm.

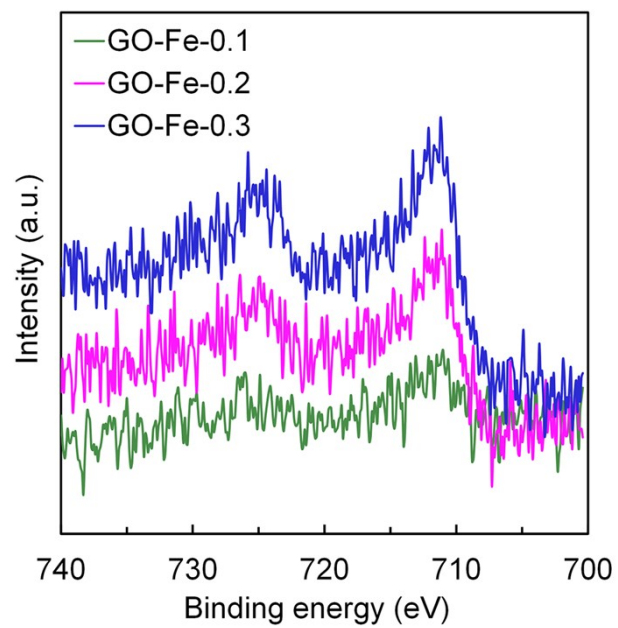


Fig. S3 The high-resolution Fe 2p spectra of GO-Fe-*c* films.

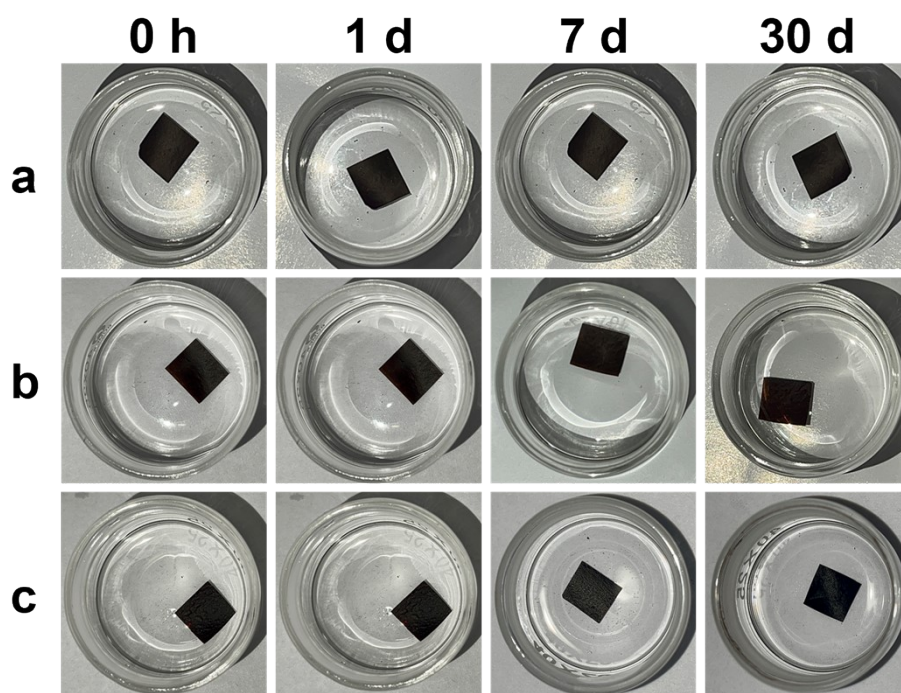


Fig. S4 Stability of (a1) GO-Mg-0.2 film, (a2) GO-Al-0.2 film and (a3) GO-Ca-0.2 film after statically soaked in water for different time. Scale bar is 1 cm.

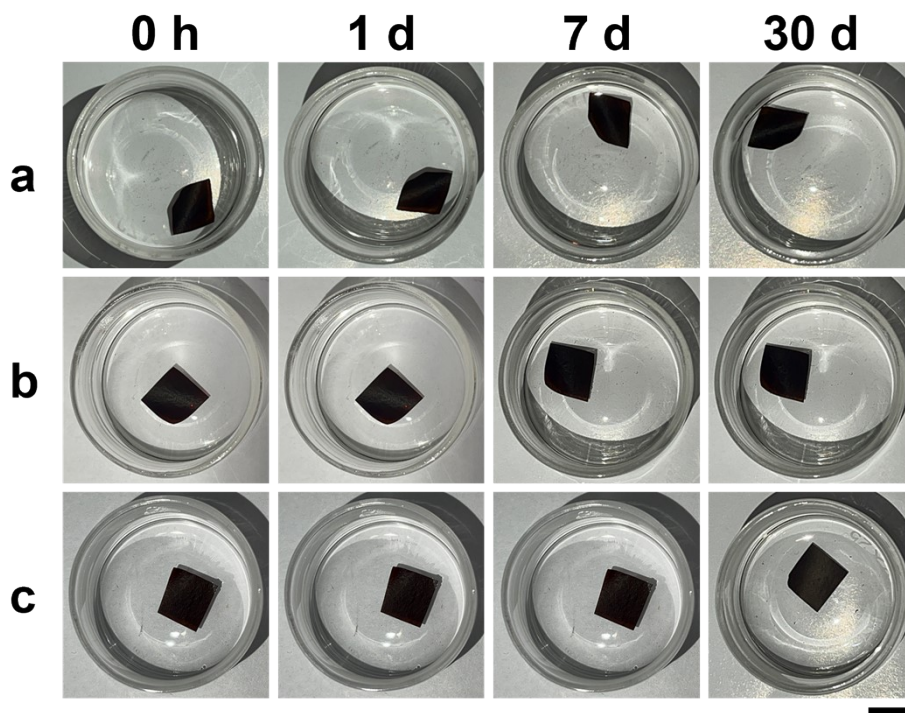


Fig. S5 Stability of (a1) GO-Mg-0.2 film, (a2) GO-Al-0.2 film and (a3) GO-Ca-0.2 film after statically soaked in ethanol for different time. Scale bar is 1 cm.

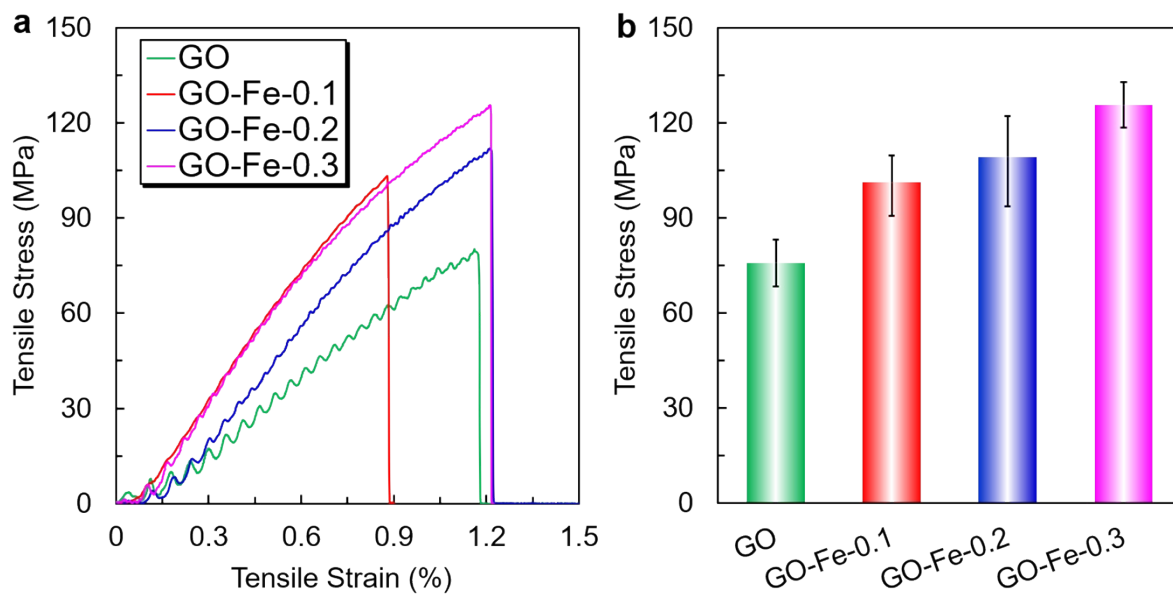


Fig. S6. Typical strain-stress curves (a) and tensile stress at break (b) of pure GO film and GO-Fe-*c* films.

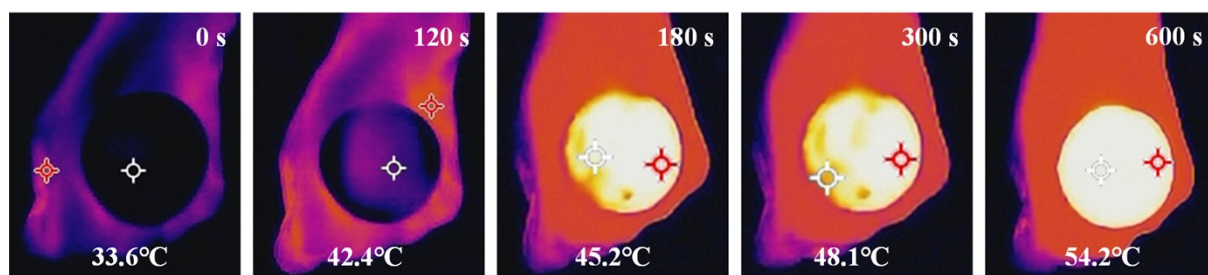


Fig. S7. Infrared thermal images of GO-Fe-0.3 film after exposure to actual sunlight for different periods of time (under 0.6 solar illumination).

Table S1 EDS results of the element content in pure GO film and GO-Fe-*c* films.

Sample	C (at. %)	O (at. %)	Fe (at. %)
GO	58.8	41.2	0
GO-Fe-0.1	57.1	41.5	1.4
GO-Fe-0.2	57.4	40.1	2.5
GO-Fe-0.3	57.8	38.1	4.1

Table S2 The areas of D and G peaks, and I_D/I_G values of Raman spectra.

Sample	Area of D peak	Area of G peak	I_D/I_G
GO	481623	360482	1.34
GO-Fe-0.1	929248	687708	1.35
GO-Fe-0.2	313726	224000	1.40
GO-Fe-0.3	566578	418438	1.35

Table S3 EDS results of the element contents in GO-*M*-0.2 film samples.

Sample	C (at. %)	O (at. %)	M (at. %)
GO-Mg-0.2	59.1	40.5	0.4
GO-Al-0.2	58.0	41.8	0.2
GO-Ca-0.2	54.1	43.3	2.6

Table S4 Comparison of temperature responses of GO-Fe-0.3 film with other similar materials under 1 solar irradiation

Materials	Time	Temperature	Reference
GO/PVA EFMs	0 min	23.4 °C	1
	30 min	54.6 °C	
	60 min	55.1 °C	
GO/HN paper	0 min	27.5 °C	2
	3 min	58.4 °C	
	10 min	62.5 °C	
BC/PVA/GO-g-LA-SSPCMs	0 min	22.5 °C	3
	30 min	47.3 °C	
	60 min	47.4 °C	
paraffin@TiO ₂ /GO	0 min	30.0 °C	4
	4000 s	92.0 °C	
Si60	0 min	25.0 °C	5
	0.5 min	69.8 °C	
	60 min	87.3 °C	
BCSO	0 min	20.0 °C	6
	10 min	91.4 °C	
	60 min	95.4 °C	
TiN/GO//GOF	5 min	30.6 °C	7
	25 min	35.4 °C	
	50 min	39.0 °C	
AuNP/GO/ESM	0 min	26.0 °C	8
	10 min	49.0 °C	
	60 min	49.5 °C	
GO-Fe-0.3	0 min	25.0 °C	This work
	5 min	59.5 °C	
	10 min	61.2 °C	

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