

## Supporting Information

# Preparation and RGB Upconversion Optic Properties of Transparent Anti-Counterfeiting Films

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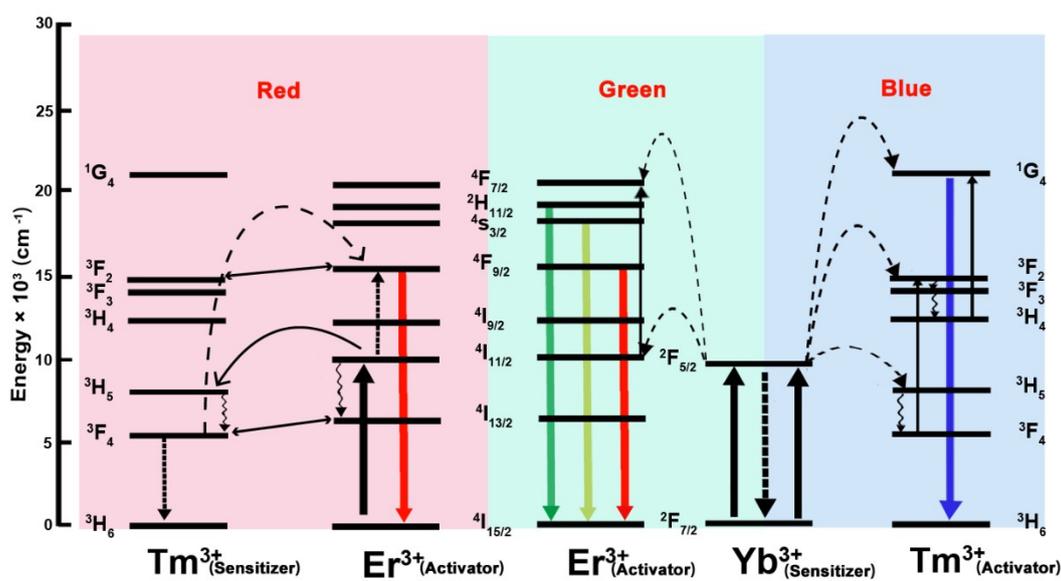
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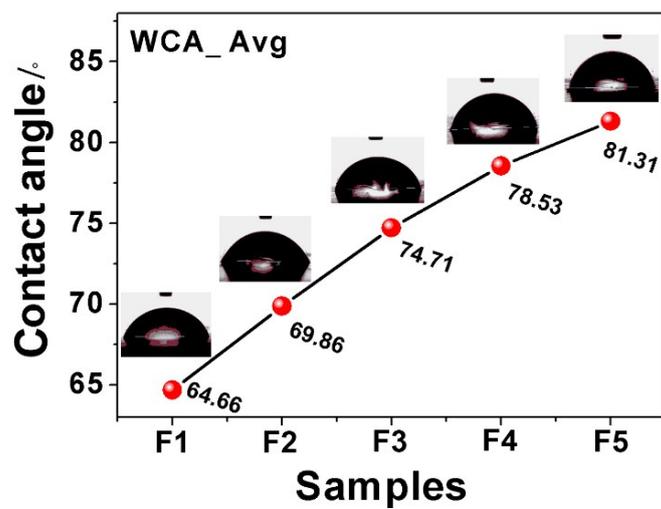
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**Table S1** Different mass ratio of UCMPs-B inks and corresponding experimental parameters of viscosity test.

Sample	Proportion			Viscosity test				
	UCMPs (wt%)	PAA (wt%)	Ethanol (wt%)	t (s)	$k$ (mm <sup>2</sup> /s <sup>2</sup> )	$\nu$ (mm <sup>2</sup> /s)	$\rho$ (g/cm <sup>3</sup> )	$\eta$ (mPa·s)
S1	5	25	70	136	0.08987	12.222	0.897	10.963
S2	5	30	65	266	0.08987	23.905	0.932	22.280
S3	5	35	60	606	0.08987	54.461	0.962	52.392
S4	5	40	55	1196	0.08987	107.485	0.990	106.410
S5	5	45	50	2923	0.08987	262.690	1.021	268.206
S6	5	43	52	2076	0.08987	186.570	1.005	187.503



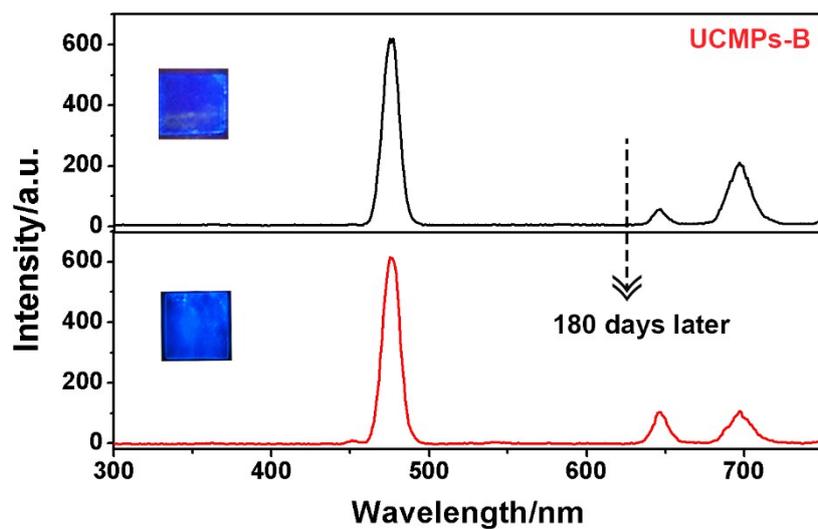
**Figure S1** Energy level diagrams of the Tm<sup>3+</sup>, Er<sup>3+</sup> and Yb<sup>3+</sup> illustrating the upconversion mechanisms under 980 nm irradiation.



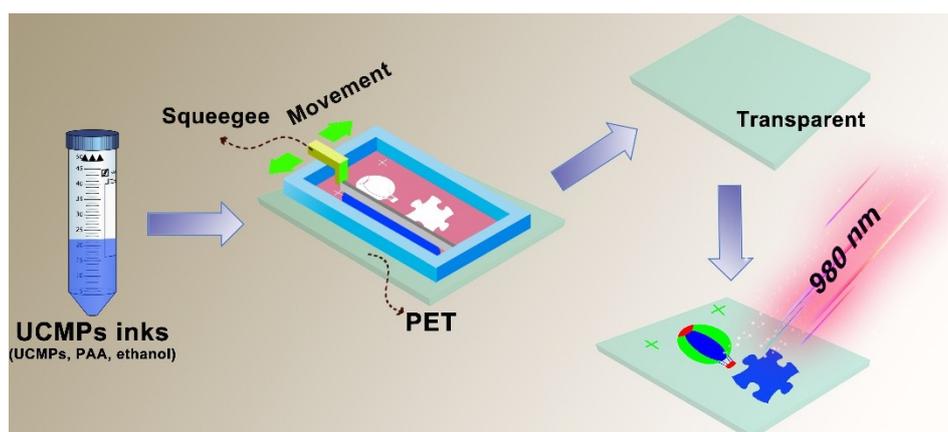
**Figure S2** Water contact angle of UCMPs-B/PAA F1-F5 films.



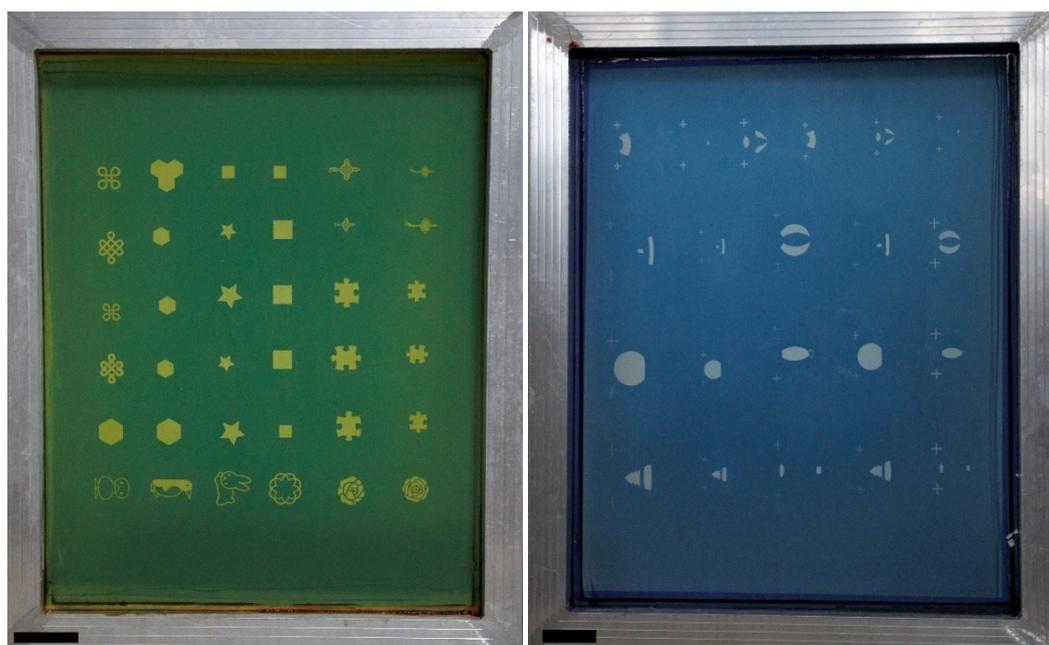
**Figure S3** Photographs of UCMPs inks at the optimal parameter (5:43:52) settled in the lab environment for 15 days.



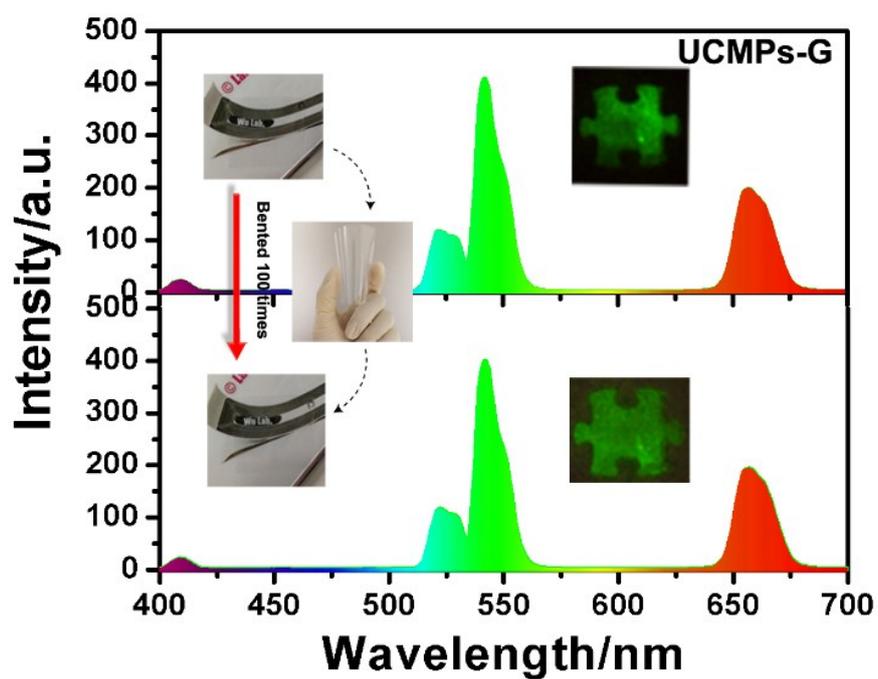
**Figure S4** Upconversion fluorescence intensity of UCMPs-B/PAA film (F6) before and after 180 days, respectively.



**Figure S5** schematic illustration of screen printing anti-counterfeiting patterns.



**Figure S6** The photograph of screen printing plates (scale bar is 5 cm).



**Figure S7** Upconversion fluorescence intensity of UCMPs-G/PAA patterns before and after bending 100 times, respectively.



**Figure S8** The photograph of stamp (scale bar is 6 mm).