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Supporting Information

Graphene hybrid colloidal crystal arrays with photo-controllable structural colors

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Supporting Table:

Table S1. Zeta potential and hydrodynamic sizes of SiO_2, GO and SiO_2/GO solutions. Data are presented as mean ± S.D. (n = 3).

Sample	Zeta potential(mV)	Hydrodynamic size(nm)	PDI
SiO_2	-10.2±1.2	361.5±55.5	0.152±0.053
GO	-42.2±2.3	472.4±52.3	0.889±0.135
SiO_2/GO	-27.0±3.2	169.3±41.3	0.103±0.043

Supporting Figures:

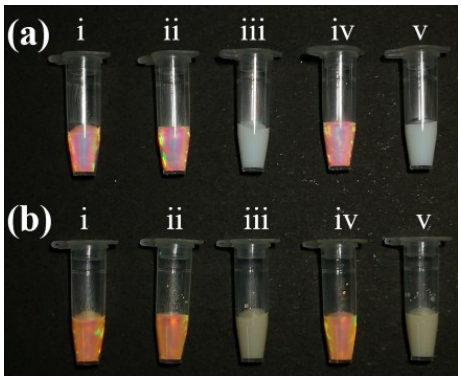

Figure S1. Optical images of prepared colloidal crystal suspensions without (a) or with (b) GO (1mg/mL) hybrid. (i) Optical images without addition of HCl and NaCl, (ii, iii) after addition of HCl (ii, 1×10^{-4} mol/L; iii, 1×10^{-2} mol/L) and (iv, v) after addition of NaCl (iv, 1×10^{-4} mol/L; v, 1×10^{-2} mol/L), respectively.

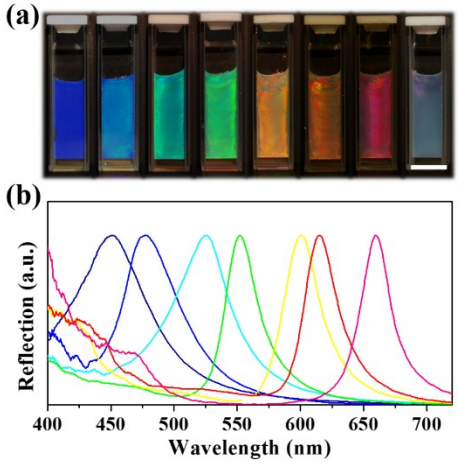

Figure S2. Optical images and reflection spectra of prepared colloidal crystal suspensions. (a) Optical images of prepared suspensions by gradually decreasing the concentrations of silica nanoparticles (from left to right, the concentrations were 0.39, 0.32, 0.24, 0.19, 0.13, 0.12, 0.08 and 0.07 g/mL, respectively). (b) Reflection spectra of the suspensions in (a), and the rightmost suspension didn't show characteristic reflection spectra. Scale bar was 1 cm.

Figure S3. Optical images of the rGO hybrid non-close-packed CCAs films with different structural color. Scale bar was 1 cm.

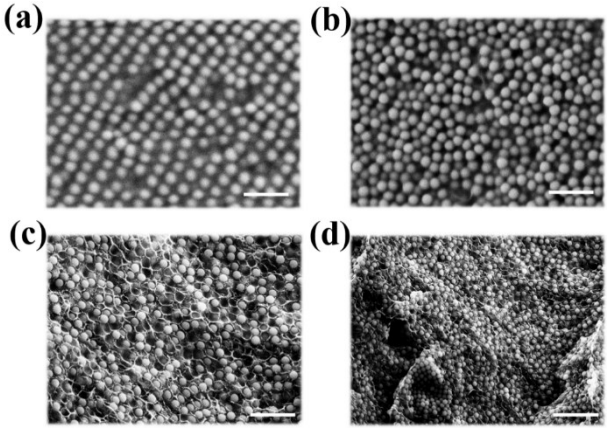

Figure S4. SEM images of the rGO hybrid non-close-packed CCAs structural color films. (a, b) The concentrations of rGO were 2 and 3 mg/mL, respectively. (c, d) Cross-section of rGO (3 mg/mL) hybrid structural color films under different magnifications. Scale bars are 500 nm in (a-c) and 1 μm in (d).

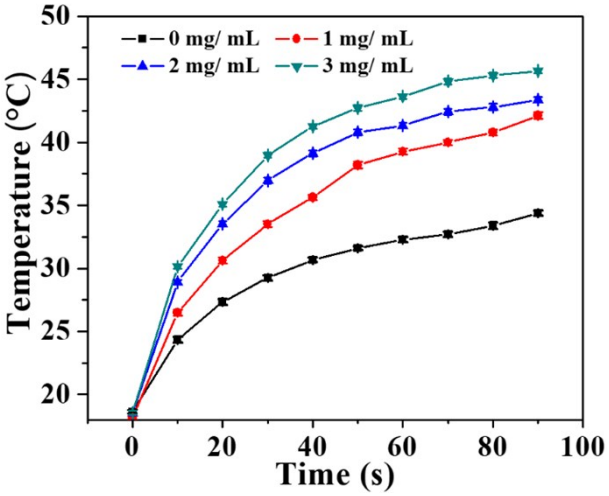

Figure S5. The relationship between the surface temperature and the rGO concentration of rGO/pNIPAM structural color hydrogel under NIR light irradiation (3W). The concentrations of rGO of the prepared structural color films were 0, 1, 2, and 3 mg/L respectively.

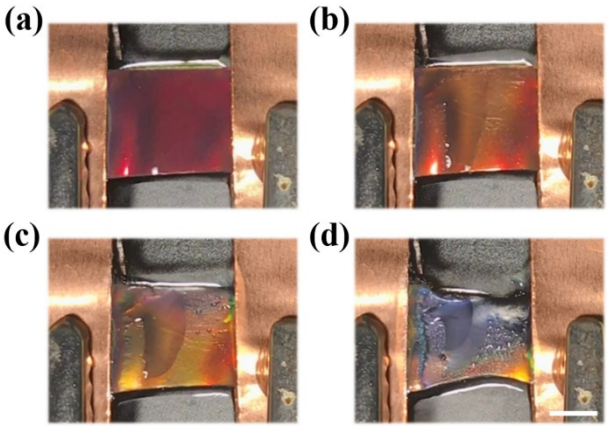

Figure S6. Optical images of the rGO/pNIPAM structural color hydrogel under electricity stimulus. Scale bar was 1 cm.

Supporting Movies

Movie S1: Optical images of the rGO/pNIPAM structural color hydrogel film under electricity stimulus.

Movie S2: Optical images of the rGO/pNIPAM structural color hydrogel shaped in sunflower under NIR light irradiation.