

Supporting Information

**Towards injured joints rehabilitation: structural color hydrogels for accelerated wound  
healing and rehabilitation exercises monitoring**

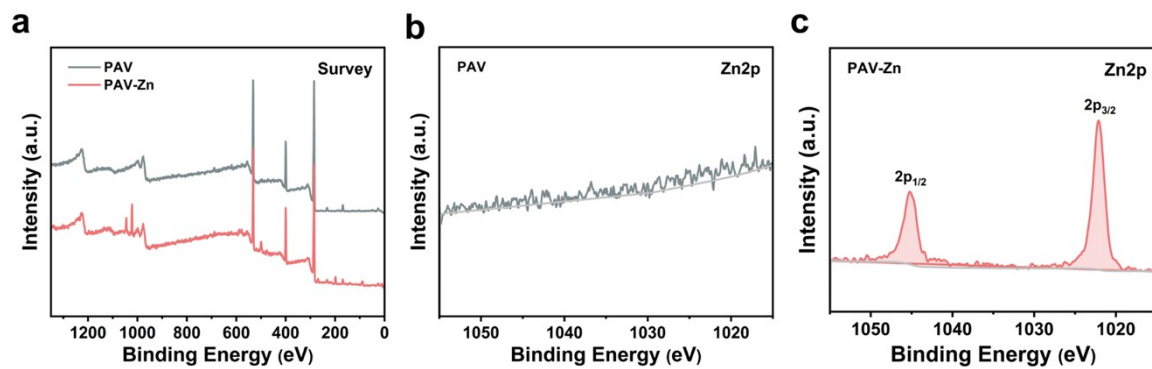
*Xiaoning Sun,<sup>a</sup> Dengfeng Lu,<sup>a</sup> Jing Cheng,<sup>a</sup> Zixin Shu,<sup>a</sup> Chunmei Ding,<sup>\*a</sup> Meng Qin<sup>\*a</sup> and Jianshu Li<sup>\*abc</sup>*

<sup>a</sup> College of Polymer Science and Engineering, National Key Laboratory of Advanced Polymer Materials, Sichuan University, Chengdu 610065, China.

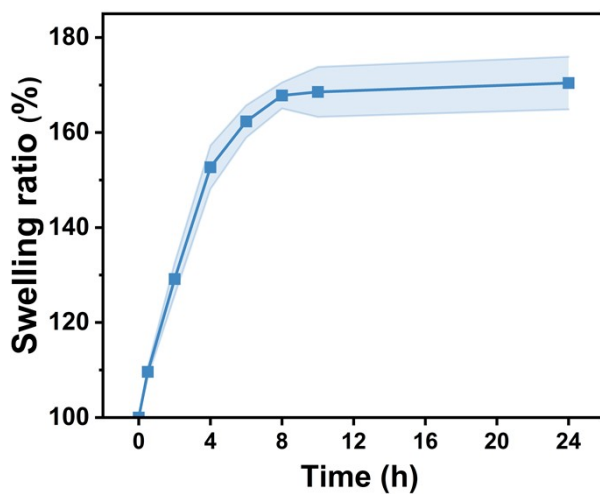
\* E-mail: dingcm@scu.edu.cn; qinmeng@scu.edu.cn; jianshu\_li@scu.edu.cn

<sup>b</sup> State Key Laboratory of Oral Diseases, West China Hospital of Stomatology, Sichuan University, Chengdu 610041, China

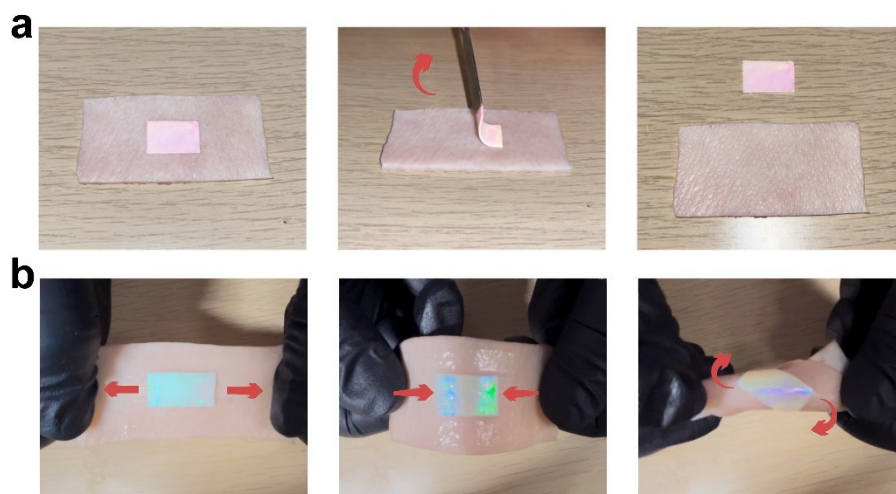
<sup>c</sup> Med-X Center for Materials, Sichuan University, Chengdu 610041, China



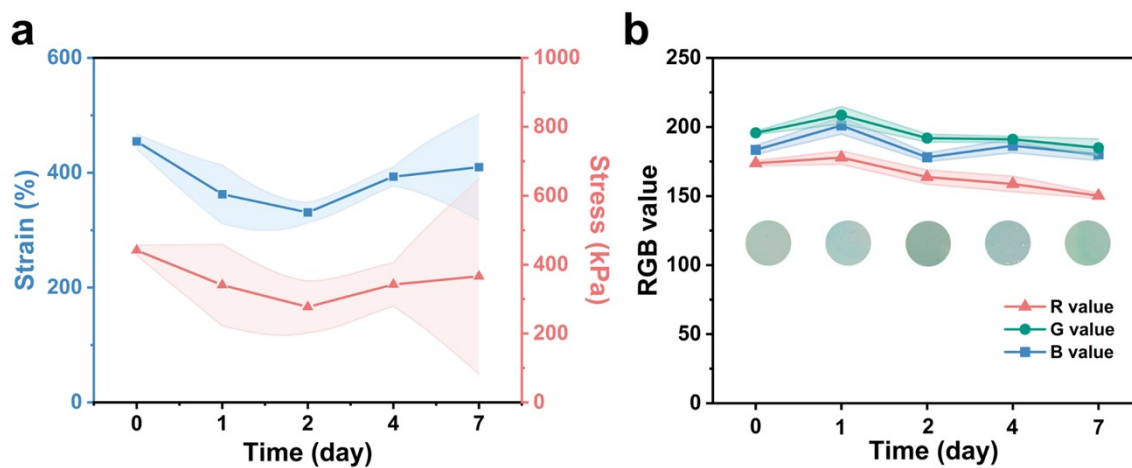
**Figure S1.** XPS spectra of a) PAV and PAV-Zn, b) Zn2p spectra of PAV, and c) Zn2p spectra of PAV-Zn.



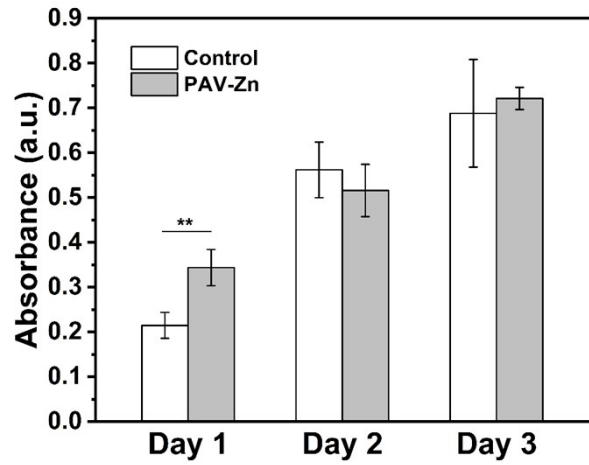
**Figure S2.** Swelling ratio of the hydrogel in PBS at different time points.



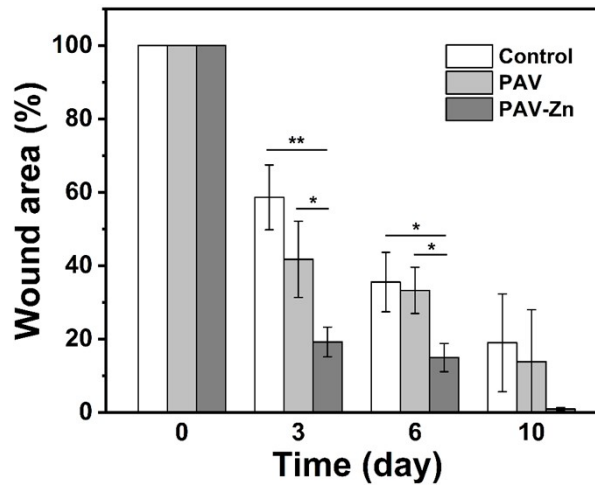
**Figure S3.** Adhesiveness testing of the structural color hydrogel. a) Attachment, peeling, and removal of structural color hydrogel on pig skin. b) Stretching, bending, and twisting of structural color hydrogel fixed on pig skin using 3M dressing.



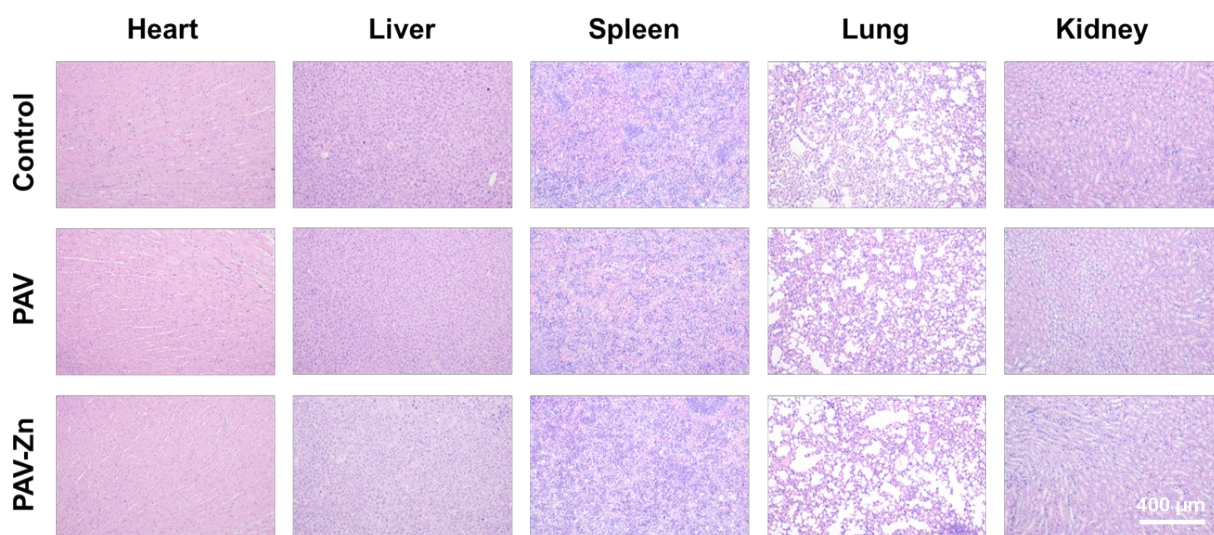
**Figure S4.** Mechanical and color properties of PAV-Zn structural color hydrogel immersed in PBS for seven days.



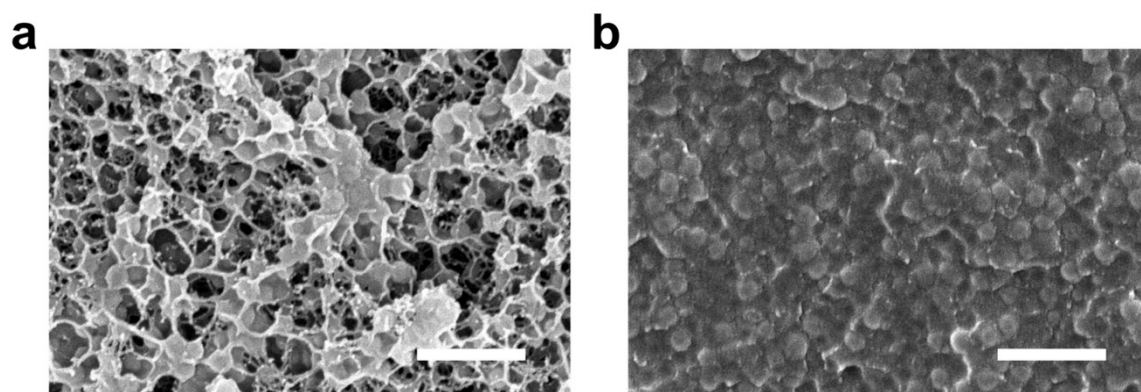
**Figure S5.** Metabolic activity of L929 cells cultured in hydrogel dispersions for 24 h, 48 h and 72 h quantified using the CCK-8 assay (n = 3, mean ± SD, \*\* $p < 0.01$  compared to Control at each time point).



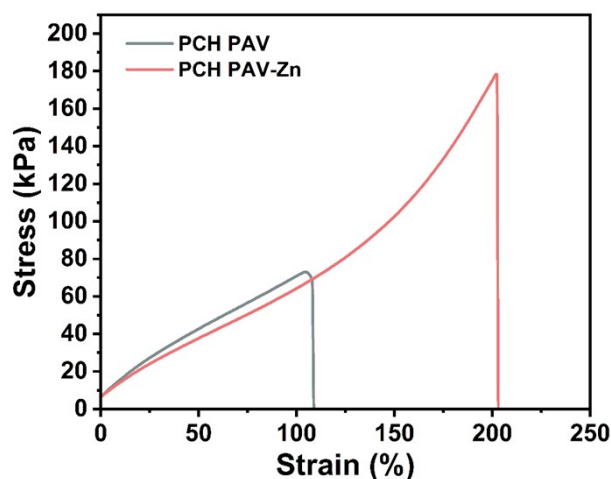
**Figure S6.** Wound area for each group (n = 3, mean ± SD, \* $p < 0.05$ , \*\* $p < 0.01$  and \*\*\* $P < 0.001$ ).



**Figure S7.** Histological analyses of the major organs (heart, liver, spleen, lungs, and kidneys) on day 10.



**Figure S8.** The SEM images of photonic crystal hydrogels of a) PAV and b) PAV-Zn. The scale bar is 1  $\mu\text{m}$ .



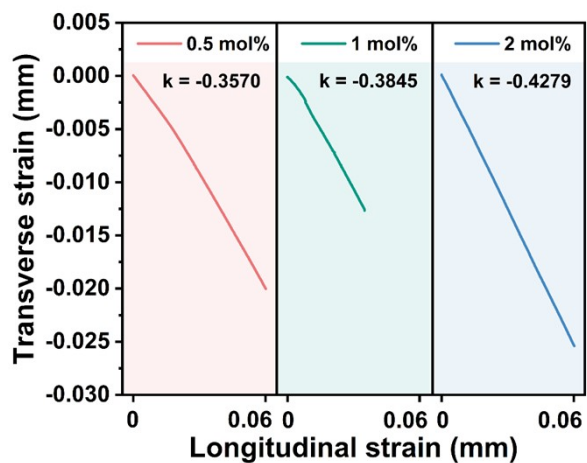
**Figure S9.** Stress-strain curves of photonic crystal hydrogels of PAV (PCH PAV) and PAV-Zn (PCH PAV-Zn) with 0.5 mol% MBAA content.

**Table S1.** Changes of  $L^*$ ,  $a^*$  and  $b^*$  of each group of structural color hydrogels with different crosslinker contents as stress changes.

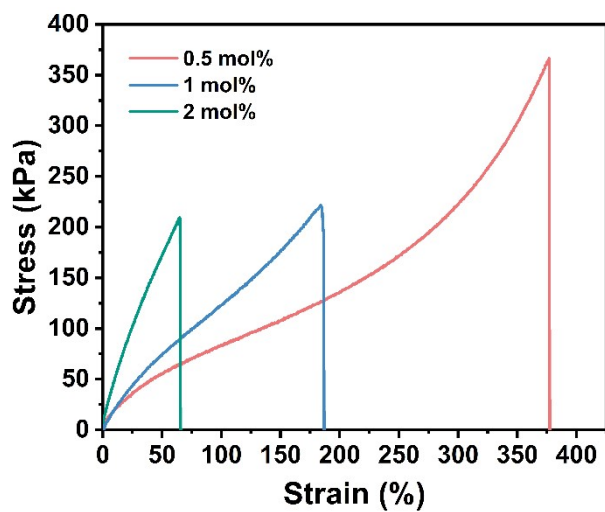
MBAA content	Strain (%)	$L^*$	$a^*$	$b^*$	$\Delta L$	$\Delta a$	$\Delta b$	$\Delta E$
0.5 mol%	0	52.09133	0.779333	-20.92	0	0	0	0
	12	51.18633	7.762333	-19.1913	-0.905	6.983	1.728667	7.25049
	24	54.48133	10.27667	-19.113	2.390003	9.497334	1.807	9.958751
	36	56.709	5.594333	-9.81233	4.61767	4.815	11.10767	12.95714
	48	62.25367	-14.4033	-0.08067	10.16234	-15.1827	20.83933	27.71397
	60	67.14233	-37.895	13.92233	15.051	-38.6743	34.84233	54.18694
	72	74.67967	-52.4643	23.947	22.58834	-53.2437	44.867	73.19951
	80	73.58567	-52.524	22.946	21.49434	-53.3033	43.866	72.3013
	96	70.38233	-44.4267	17.04467	18.291	-45.206	37.96467	61.80177

**Table S1. Cont.**

MBAA content	Strain (%)	$L^*$	$a^*$	$b^*$	$\Delta L$	$\Delta a$	$\Delta b$	$\Delta E$
1 mol%	0	57.77	3.282667	2.276333	0	0	0	0
	6	60.27533	0.430667	-0.86433	2.505333	-2.852	-3.14067	4.926904
	12	59.34933	-3.86267	-4.61233	1.579333	-7.14533	-6.88867	10.05007
	18	56.77767	-10.0957	-9.20333	-0.99233	-13.3783	-11.4797	17.65637
	24	56.013	-10.873	-16.969	-1.757	-14.1557	-19.2453	23.95522
	30	54.67267	-9.47467	-25.368	-3.09733	-12.7573	-27.6443	30.60314
	40	51.58133	-3.48367	-32.5983	-6.18867	-6.76633	-34.8747	36.06002
	50	52.01933	1.491667	-38.8813	-5.75067	-1.791	-41.1577	41.59605
	60	54.81333	4.376	-43.3443	-2.95667	1.093333	-45.6207	45.72945
2 mol%	0	78.86867	6.372333	-5.536	0	0	0	0
	4	69.238	5.113667	-6.35567	-9.63067	-1.25867	-0.81967	9.747097
	8	63.85133	5.296333	-7.41367	-15.0173	-1.076	-1.87767	15.17247
	12	65.49933	-6.93967	-7.161	-13.3693	-13.312	-1.625	18.93645
	18	65.10067	-20.2937	-9.27333	-13.768	-26.666	-3.73733	30.24237
	24	68.25367	-29.179	-9.51767	-10.615	-35.5513	-3.98167	37.31527
	30	72.55233	-31.4213	-12.472	-6.31634	-37.7937	-6.936	38.94054
	36	70.253	-31.0477	-16.4977	-8.61567	-37.42	-10.9617	39.933
	42	69.05267	-28.2427	-17.2357	-9.816	-34.615	-11.6997	37.8343

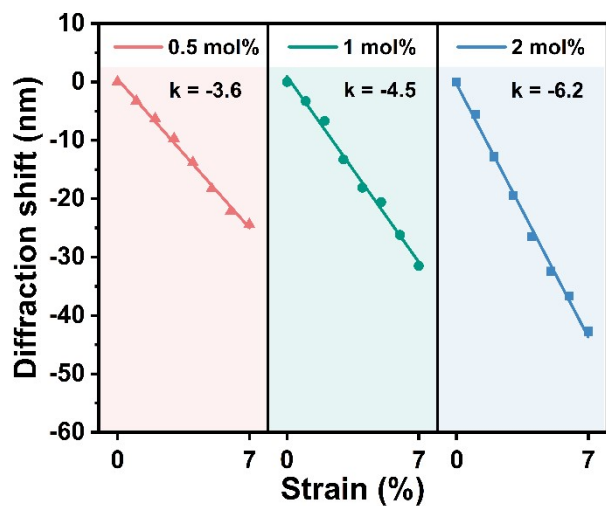


**Figure S10.** The curves of longitudinal strain-transverse strain to determine Poisson's ratio of PAV-Zn with different MBAA contents.

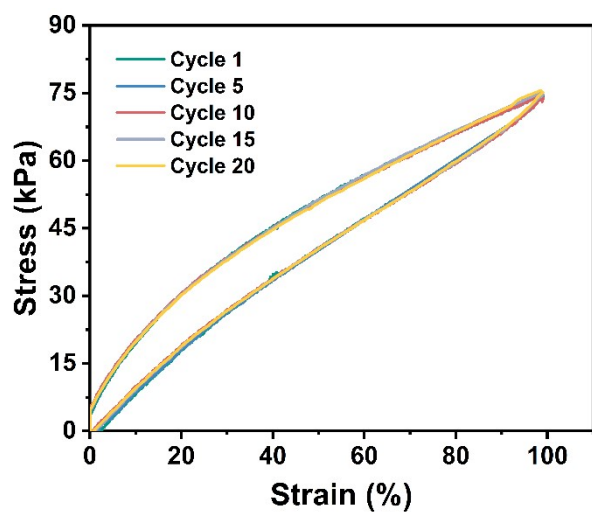


**Figure S11.** Stress-strain curves of PAV-Zn hydrogels with different concentrations of MBAA.

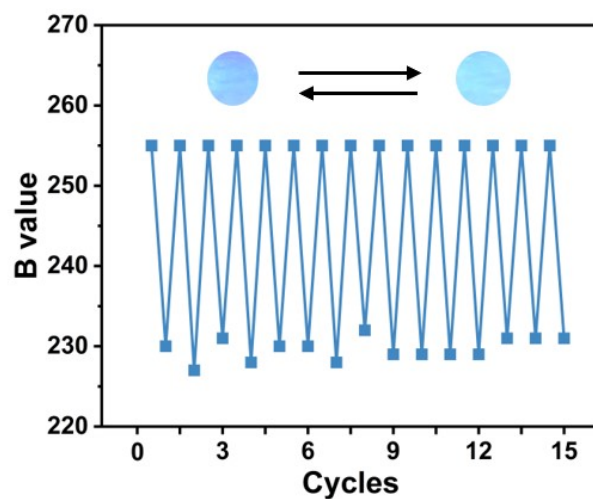




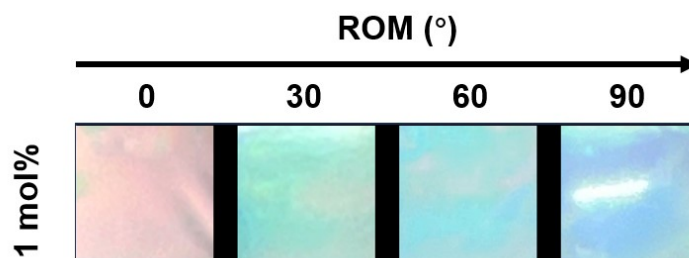
**Figure S12.** Sensitivity of PAV-Zn with different MBAA contents.



**Figure S13.** Stress-strain curves of PAV-Zn hydrogels with 0.5 mol% MBAA content subjected to 100% tensile strain for twenty cycles.



**Figure S14.** B-value of the structural color hydrogel with 1 mol% MBAA content subjected to 20%-60% tensile strain in fifteen cycles.



**Figure S15.** Photographs of structural color hydrogel with MBAA content of 1 mol% at finger ROM of 0-90°.