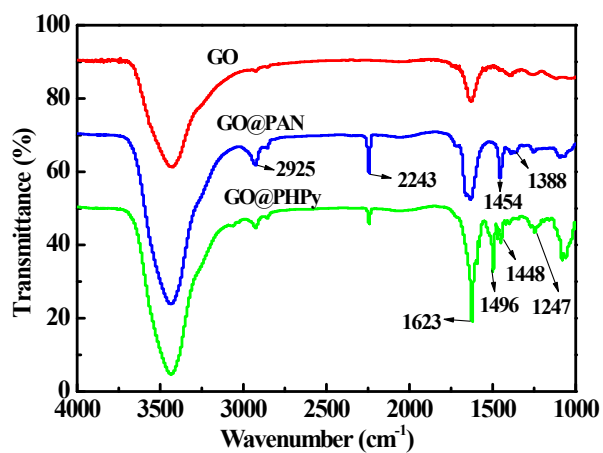


## Supporting Information

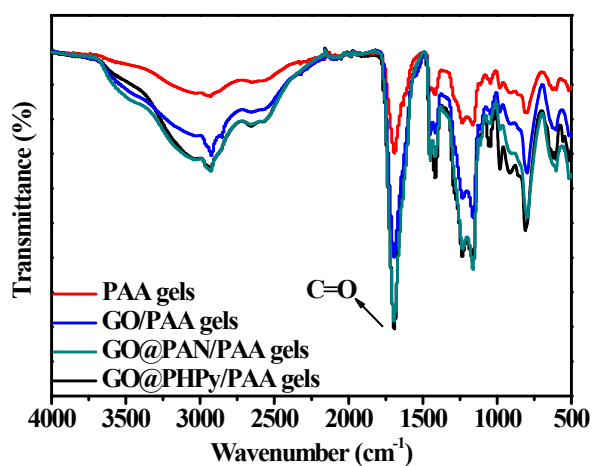
### **Self-healing and Tough GO-supported Hydrogels via Surface-initiated ATRP and Photocatalytic Modification**

Dechao Fan, Wenxiang Wang, Hou Chen\*, Liangjiu Bai\*, Huawei Yang, Donglei Wei, Lixia Yang, Zhongxin Xue, Yuzhong Niu

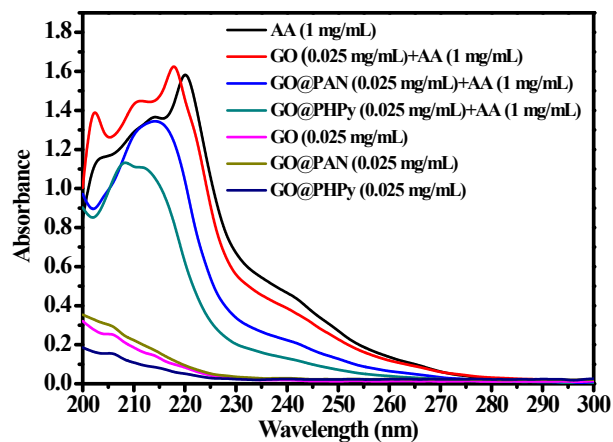
Key Laboratory of High Performance and Functional Polymer in the Universities of Shandong Province; Collaborative Innovation Center of Shandong Province for High Performance Fibers and Their Composites; School of Chemistry and Materials Science. Ludong University, Yantai 264025, China. E-mail: [chenhou@ldu.edu.cn](mailto:chenhou@ldu.edu.cn) (H. Chen), Tel: +86-535-6697933; [bailiangjiu@ldu.edu.cn](mailto:bailiangjiu@ldu.edu.cn) (L. J. Bai), Tel: +86-535-6669070.



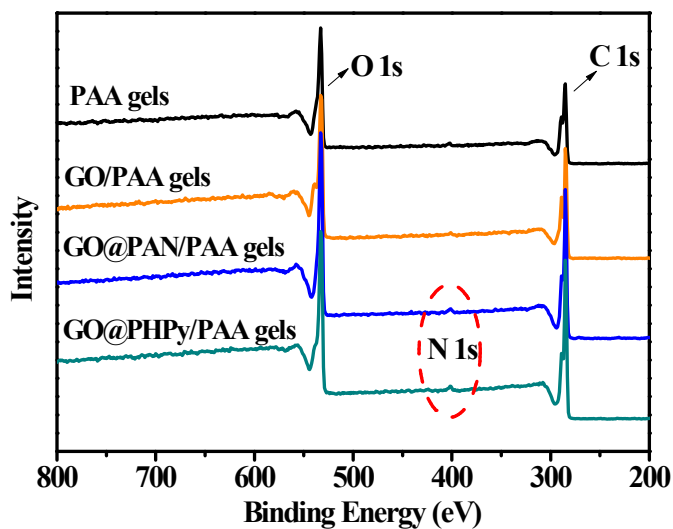
**Figure S1.** The FT-IR spectrogram of GO, GO@PAN and GO@PHPy.



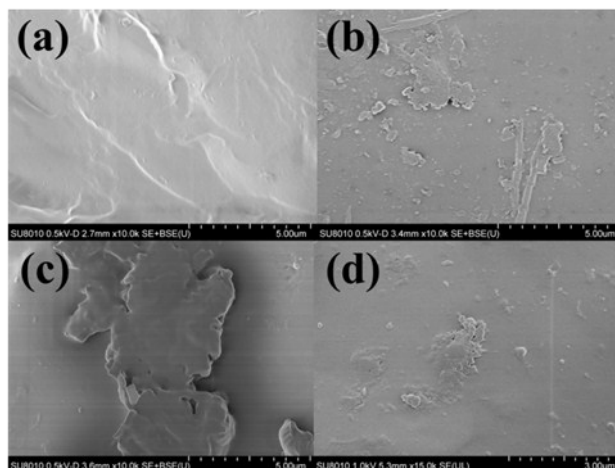
**Figure S2.** FT-IR spectrogram of PAA, GO/PAA, GO@PAN/PAA and GO@PHPy/PAA composite hydrogels.



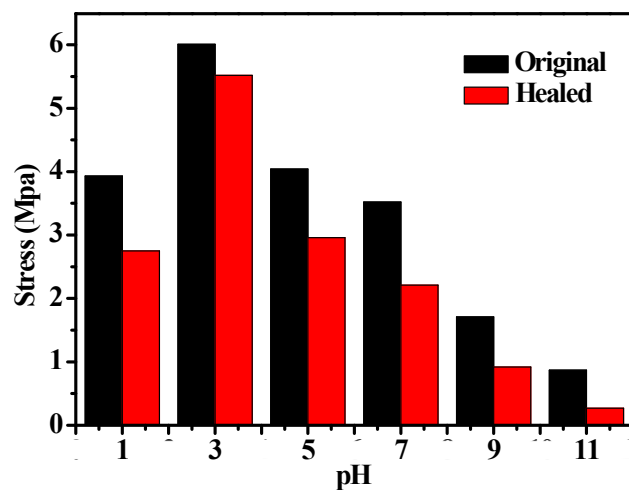
**Figure S3.** UV-Vis spectra of GO (0.025 mg/mL), GO@PAN (0.025 mg/mL), GO@PHPy (0.025 mg/mL), AA (1 mg/mL), GO (0.025 mg/mL)+AA (1 mg/mL), GO@PAN (0.025 mg/mL)+AA (1 mg/mL) and GO@PHPy (0.025 mg/mL)+AA (1 mg/mL) solution.



**Figure S4.** XPS spectra of PAA gels, GO/PAA gels, GO@PAN/PAA gels and GO@PHPy/PAA gels.



**Figure S5.** SEM image of PAA hydrogels (a), GO/PAA hydrogels (b) GO@PAN/PAA gels (c) and GO@PHPy/PAA hydrogels (d).



**Figure S6.** Stress image of GO@PHPy/PAA gels at different pH.

**Table S1.** Chemical composition of GO, GO@DETA, GO@BiBB, GO@PAN and GO@PHPy from XPS.

Samples	XPS (atom %)			
	C	O	Br	N
GO	64.2	29.5	0	0
GO@DETA	64.4	25.6	0	5.6
GO@BiBB	65.5	24.6	0.4	5.9
GO@PAN	74.4	3.3	0.1	21.4
GO@PHPy	77.1	5.1	0.1	16.8