

## Supporting Information

### **A novel environment-tolerant hydrogel via combination effect of polyurethane coating and hygroscopic salt for underwater monitoring**

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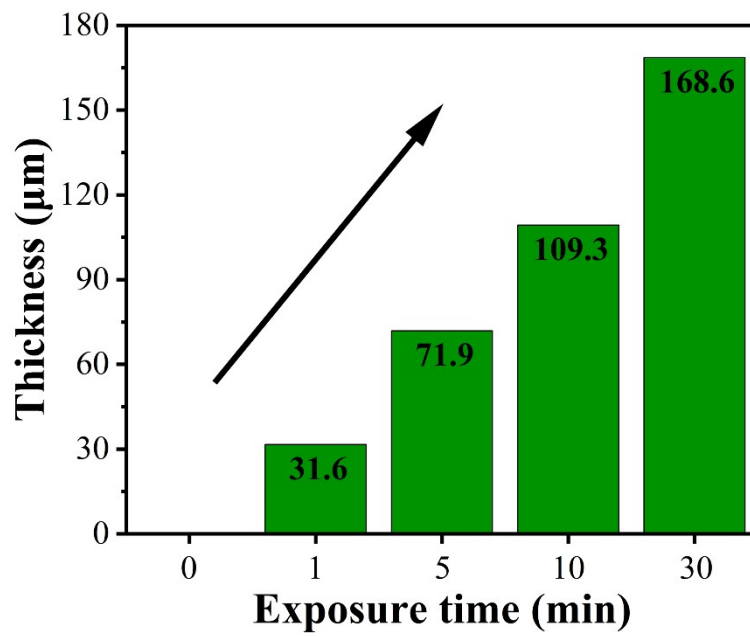


Figure S1. The thickness of the polyurethane coating with different UV exposure times.

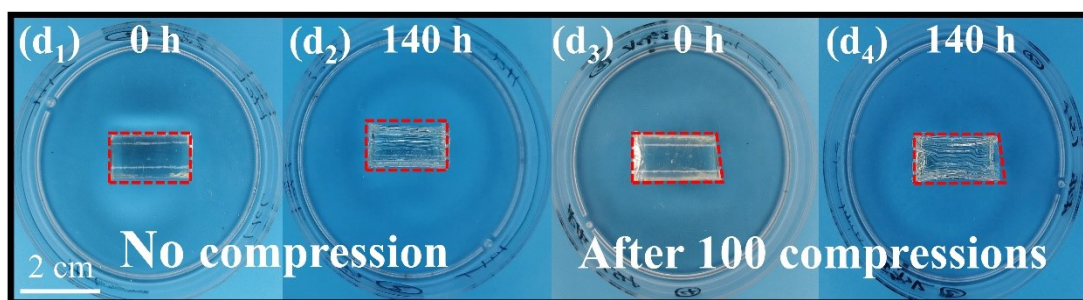


Figure S2. Photographs of the 8M PAAm with coating-UV-30 before and after 100 consecutive compressions during the drying experiments with 30 RH% at 25 °C for 140 h.

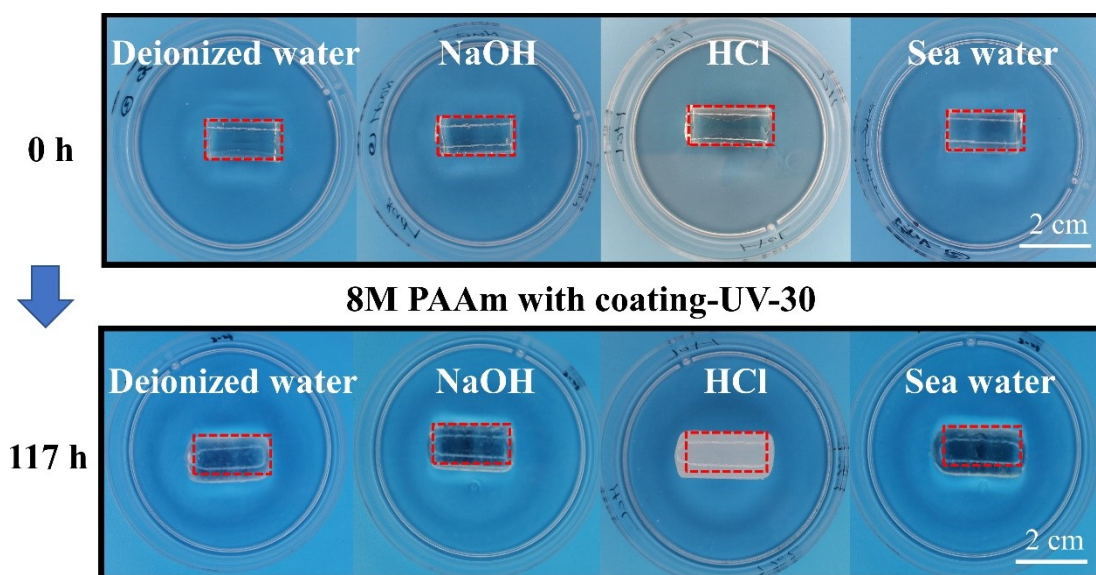


Figure S3. Snapshots of 8M PAAm with coating-UV-30 hydrogels being soaked for 117 h in different conditions.

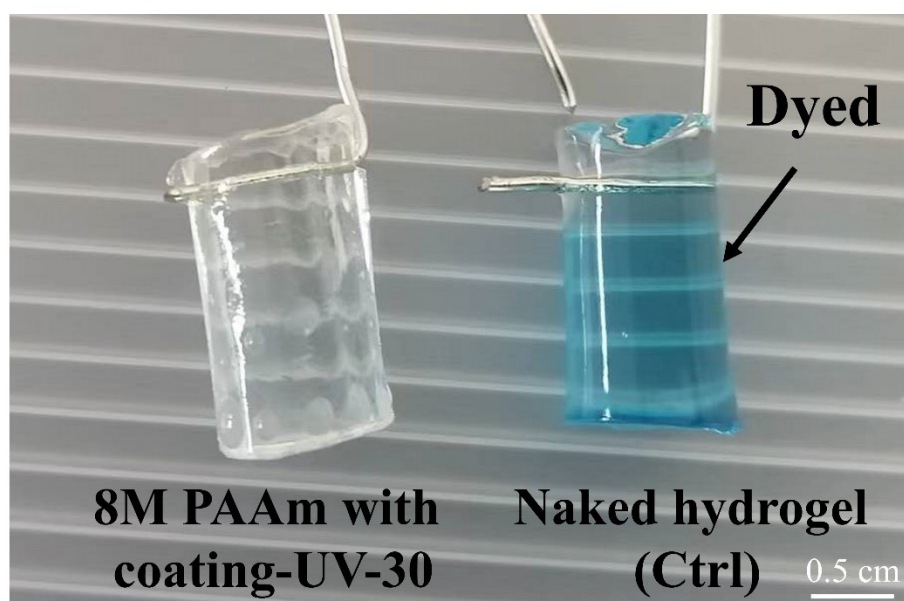


Figure S4. A comparison photo of 8M PAAm with coating-UV-30 and 8M PAAm without coating hydrogels immersed in colored water for 3 min, then taken out and washed with deionized water. The color of 8M PAAm with coating-UV-30 was readily washed away in clean water while the naked hydrogel cannot be washed away. The dye was methylene blue.

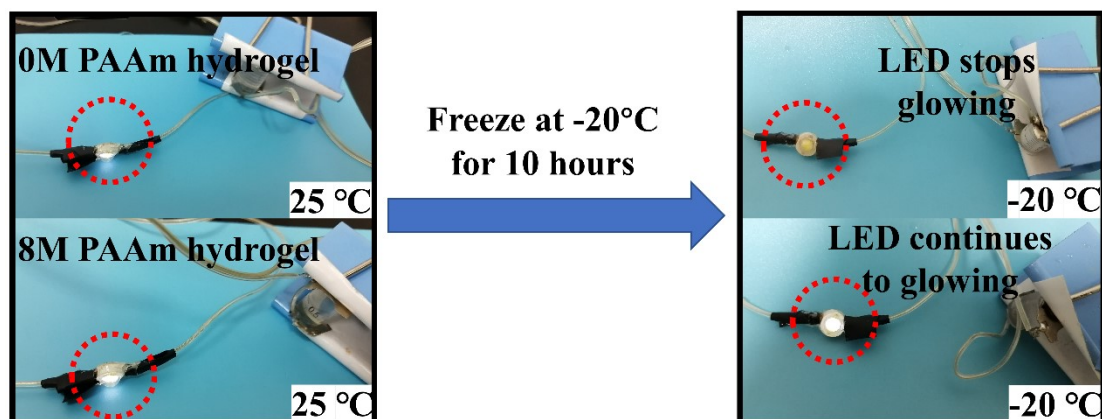


Figure S5. Anti-freezing measurements of LiCl-free and LiCl-based PAAm hydrogel (8M) as a wire in an electric circuit. The LiCl-based hydrogel was still conductive after freezing at  $-20\text{ }^{\circ}\text{C}$  for 10 h, the LED continued to glow, whereas the LED went out in the circuit where the LiCl-free hydrogel was.

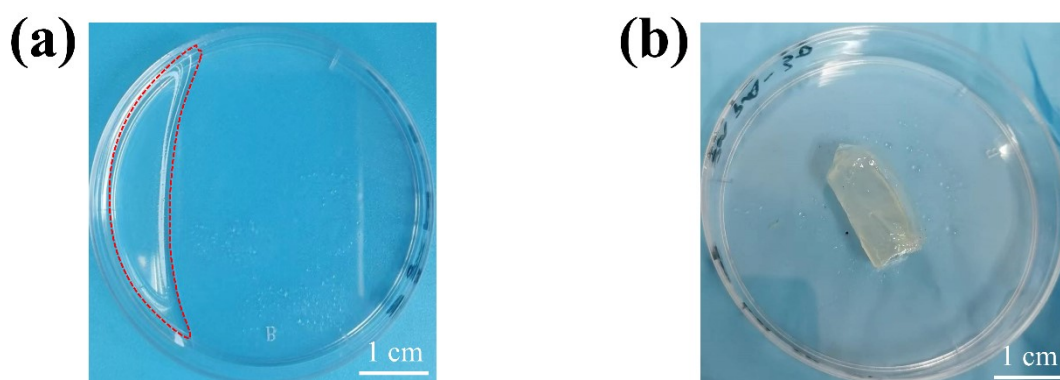


Figure S6. (a) The 8M PVA without coating hydrogel undergoing gelation from a gel state into a viscous state. (b) The photograph of 8M PVA with coating-UV-30 hydrogel placed in an environment with a designed RH program after 120 h.



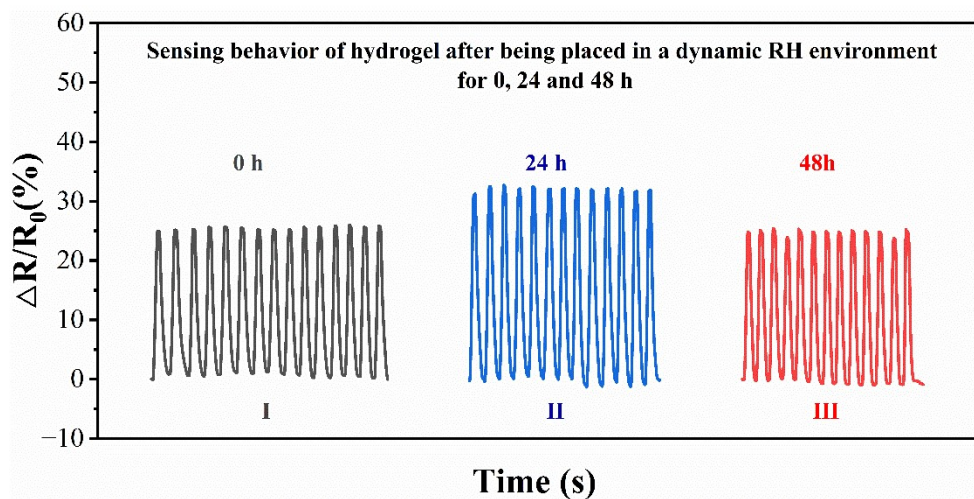


Figure S7. The sensing behavior of 8M PAAm with coating-UV-30 hydrogel at 15% strain in air. The sensing signals I, II, and III were obtained after the hydrogel was placed in a dynamic RH environment as same as Figure 3c for 0, 24 and 48 h, respectively.