Video S1. The PAA-Lys-Al hydrogel can support a 4 kg weight.

Video S2. The PAA-Lys-Al hydrogel can light up LED under -10 ℃.

Video S3. LED brightness variation of the hydrogel upon stretching–releasing cycles at −10 °C.

Video S4. Five cycles of finger bending (180°, 135°, 90°) for the hydrogel sensor at −10 °C.

Video S5. The self-healing hydrogel “bracelet” can be wrapped around.

Video S6. The self-healed PAA-Lys-Al hydrogel is capable of lighting up an LED.