Supporting Information

Seawater-Enhanced Tough Agar/Poly(N-isopropylacrylamide)/Clay Hydrogel for Anti-Adhesion and Oil/Water Separation

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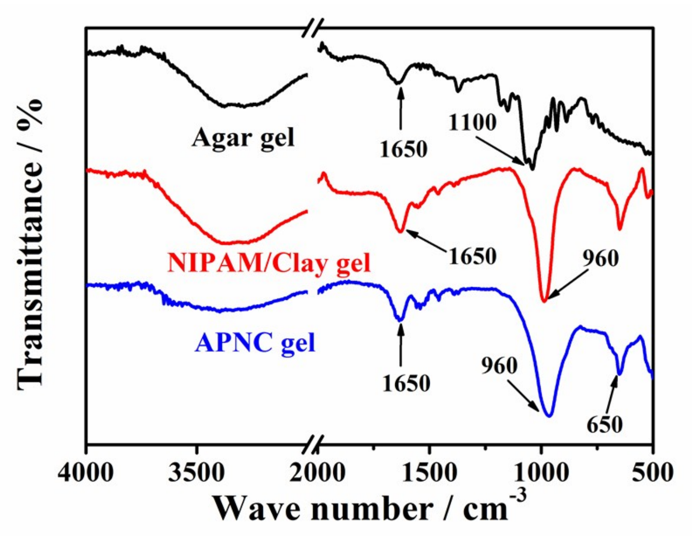

Figure S1. FT-IR spectra of Agar, NIPAM/Clay, and APNC gels. The peaks at 1650 cm^{-1} and 1100 cm^{-1} were contributed to N-H bending and O-H strectching vibration, respectively, 960 cm^{-1} and 650 cm^{-1} were the absoption peaks for Si-O stretching and metallic oxide stretching (Li-O, Mg-O, etc.), respectively.

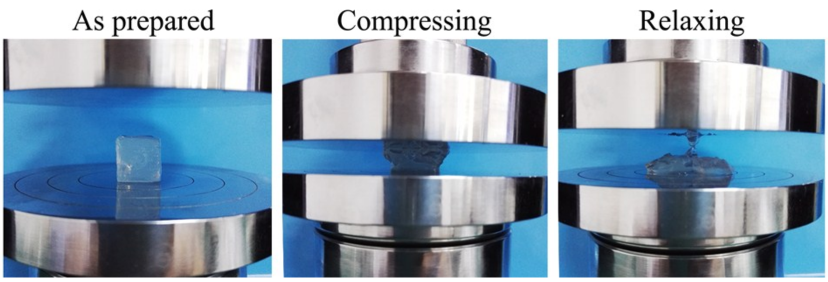

Figure S2. The compression tests of the agar gel.

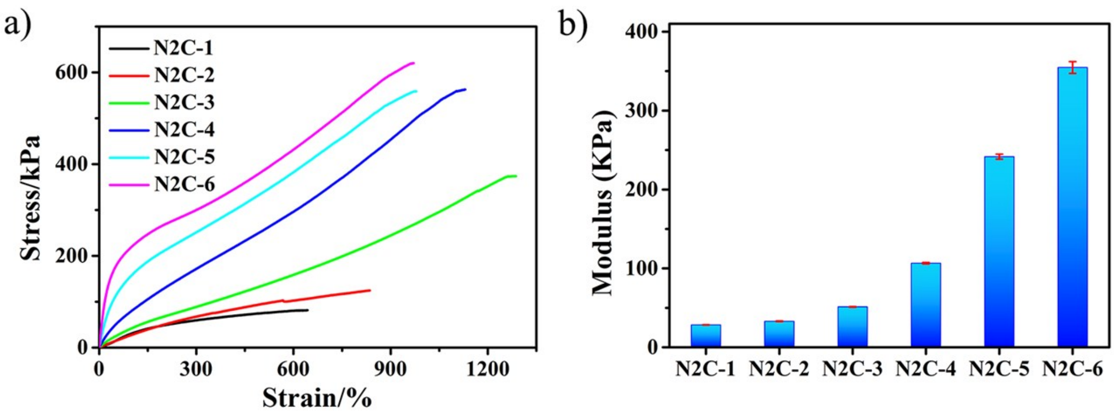

Figure S3. a) Stress-stain curves of the APNC gels with different clay contents (N2C-n: hydrogel containing 0.05n g/mL clay). The concentration of agar was 0.01g/mL, and NIPAM was 0.1g/mL. b) The modulus of the as-prepared APNC gel with different clay contents.

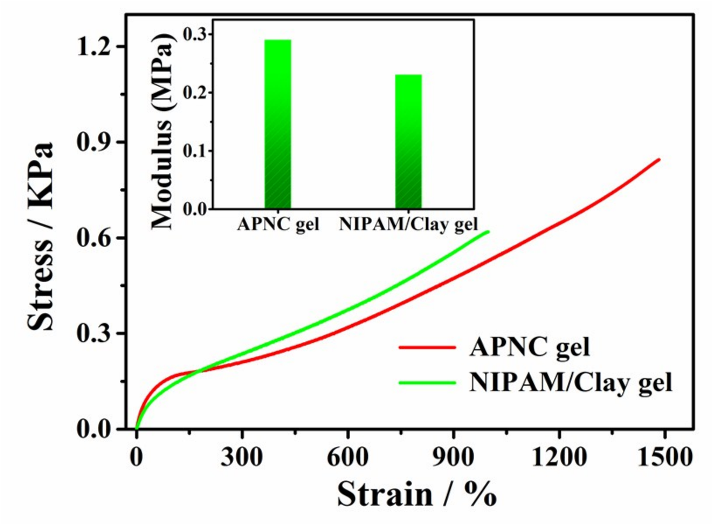

Figure S4. Tensile strength and modulus of the APNC gel (0.85 MPa, 0.29 MPa) and the NIPAM/Clay gel (0.62 MPa, 0.23 MPa).

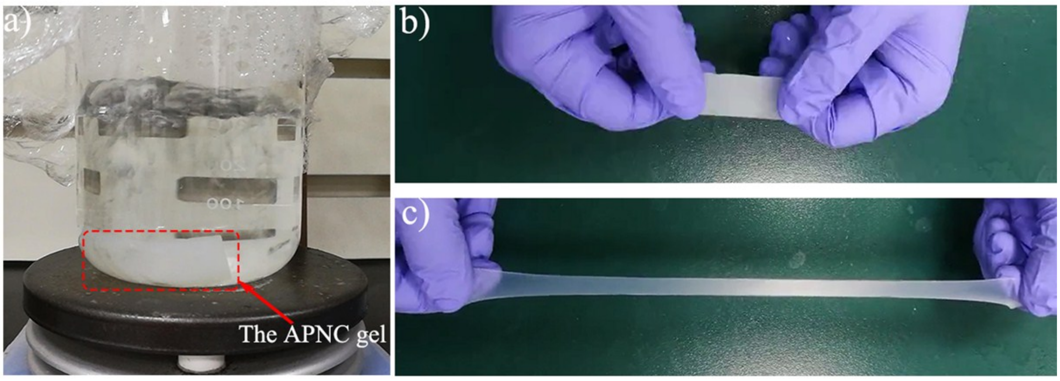

Figure S5. a) The process of the APNC gel keeping in boiling seawater. b&c) The illustrations of the excellent mechanical properties of the APNC gel after keeping in boiling seawater for 30 min.

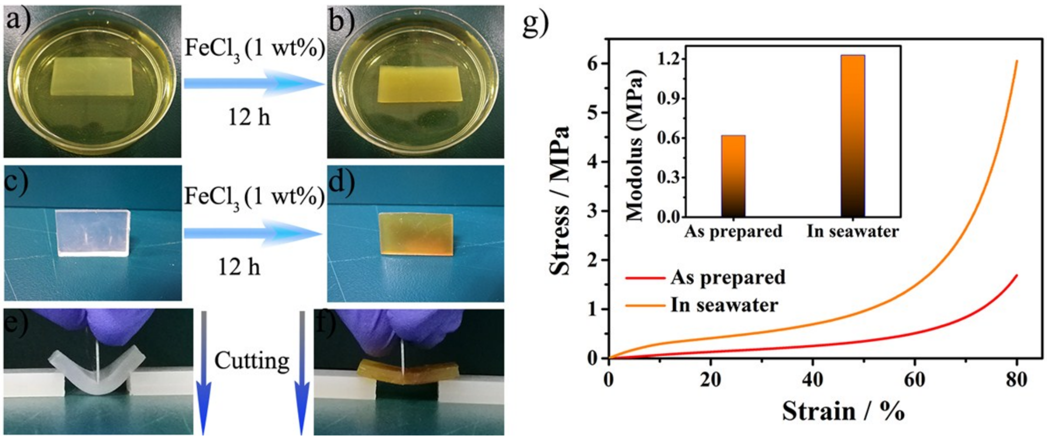

Figure S6. a-d) The images of the APNC gel before (a&c, transparent) and after (b&d, brown) immersed in $FeCl_3$ solution for 12 hours. e&f) The cutting process of the as prepared APNC gel (e) and the Fe^{3+} enhancement APNC gel (f) with the same cutting force and speed. g) The compressive strength and modulus of the as-prepared APNC gel (1.68 MPa, 0.62 MPa) and the APNC gel immersed in $FeCl_3$ solution for 12 h (6.05 MPa, 1.23 MPa).

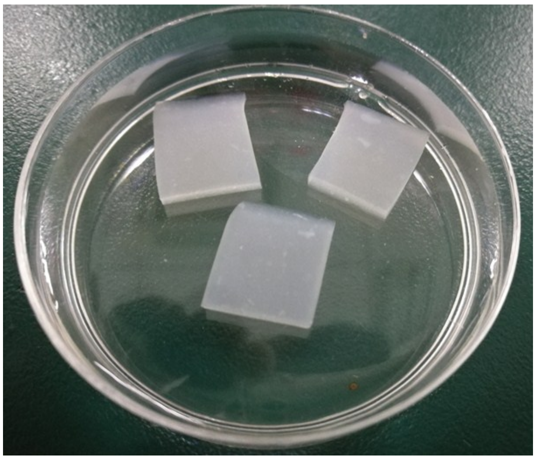

Figure S7. The image of the APNC gel after immersed in seawater for more than 1 month.

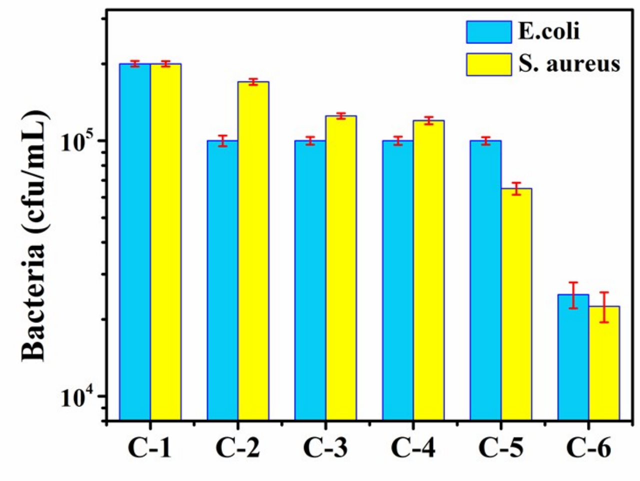

Figure S8. The counts of the bacteria (*E.coli* and *S. aureus*) attaching to APNC gel with different clay content (C-n: hydrogel containing 0.05n g/mL clay) after being maintained for 72 h.

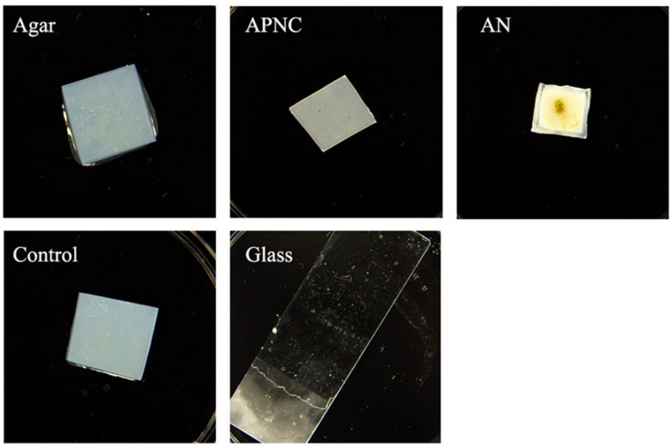

Figure S9. The images of the E.coli attaching to different material surfaces (including agar gel, APNC gel, AN gel, Glass, and Agar/LB gel (Control)), which have been maintained for 12 days.

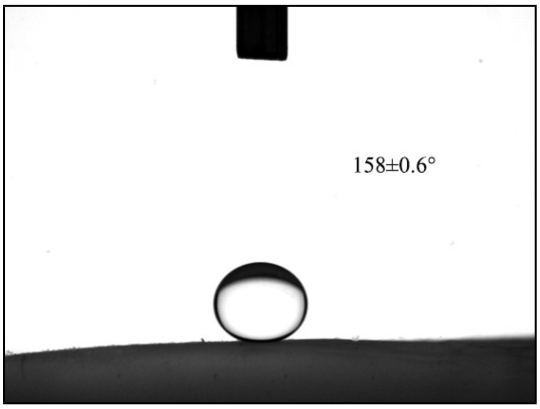

Figure S10. The optical image of a oil droplet (3 μL) with a contact angle of 158±0.6° on the surface of the APNC gel underwater.

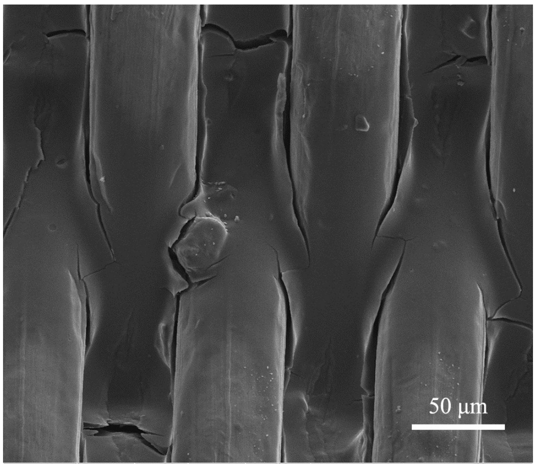

Figure S11. The SEM images of the APNC gel-coated stainless steel mesh.

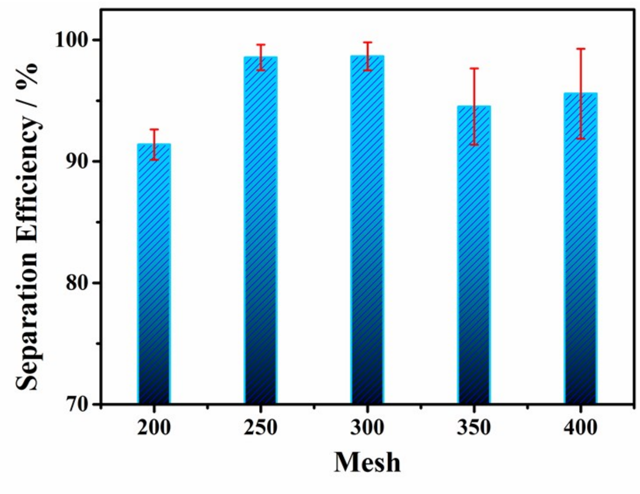

Figure S12. The separation efficiency of the gel coated mesh with different pore size, including 200 (74 μm), 250 (61μm), 300 (50 μm), 350 (43 μm), 400 (38 μm) mesh.

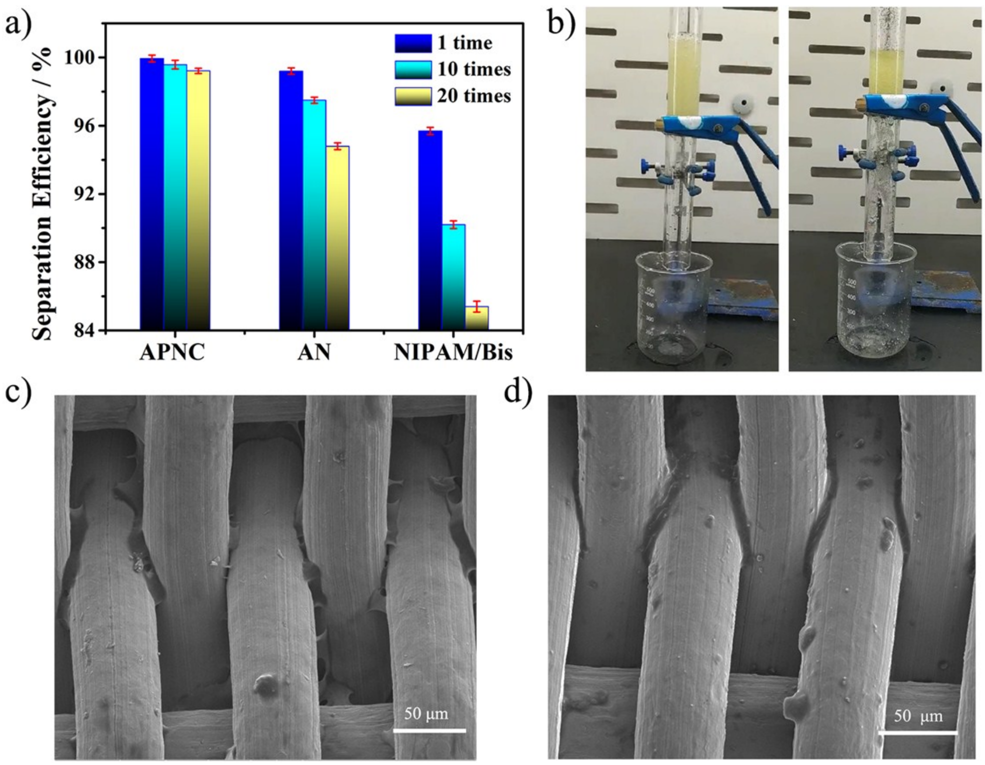

Figure S13. a) The separation efficiencies of the different gel-coated mesh (APNC gel, AN gel and NIPAM/Bis gel). The oil was vegetable oil and the oil content was 50 v/v%. b) The process of the oil/seawater separation by the NIPAM/Bis gel-coated mesh. c&d) The SEM images of the AN gel-coated mesh (c) and NIPAM/Bis gel-coated mesh (d), and the mesh is 300.

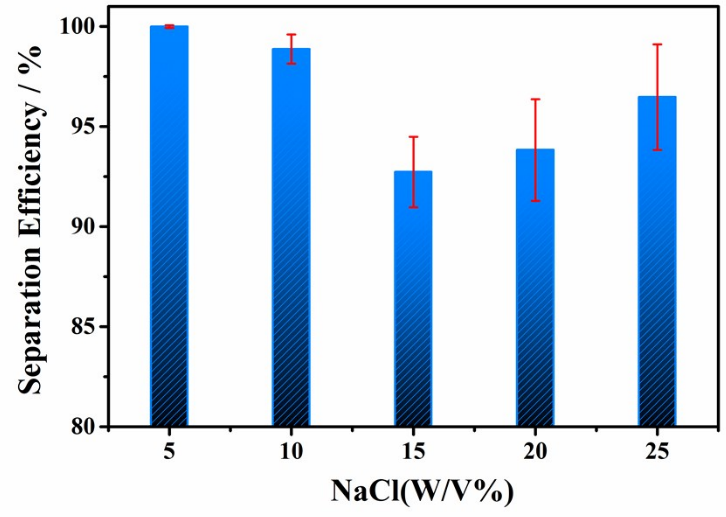

Figure S14. The separation efficiency of oil/water mixtures of diesel oil and seawater with different NaCl concentration (5-25 wt%).