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Supporting Information

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Supporting Information

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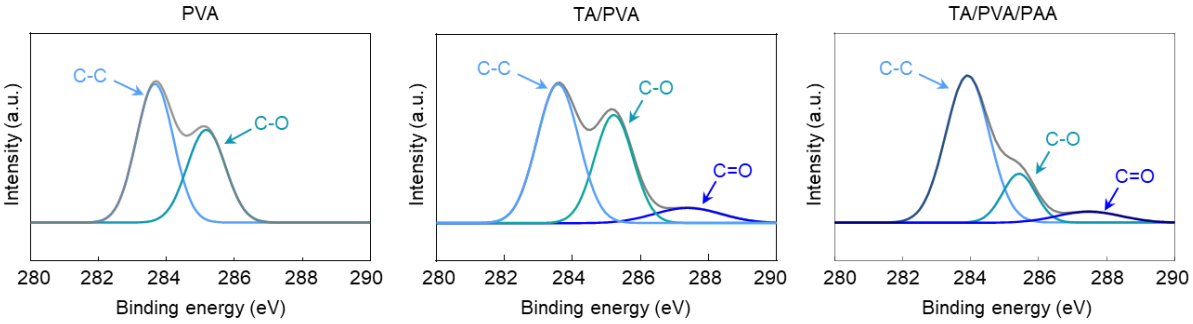

Figure S1. XPS spectra for hydrogel groups.

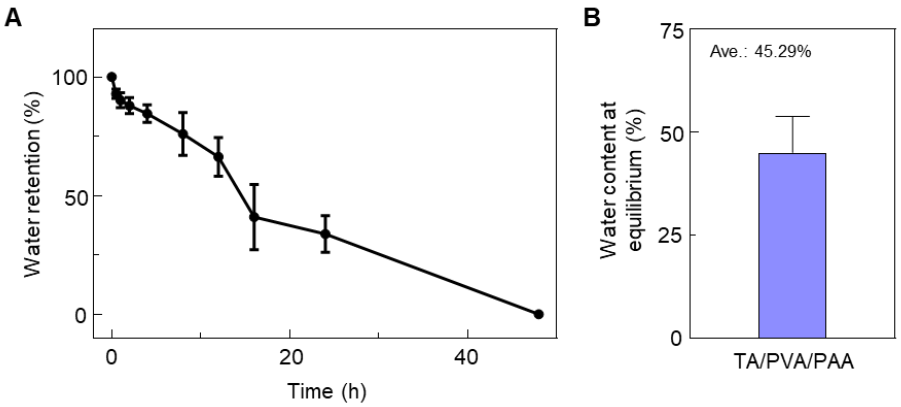

Figure S2. (A) Water retention-time profile and (B) water retention at equilibrium of TA/PVA/PAA hydrogel (n = 9, for each group).

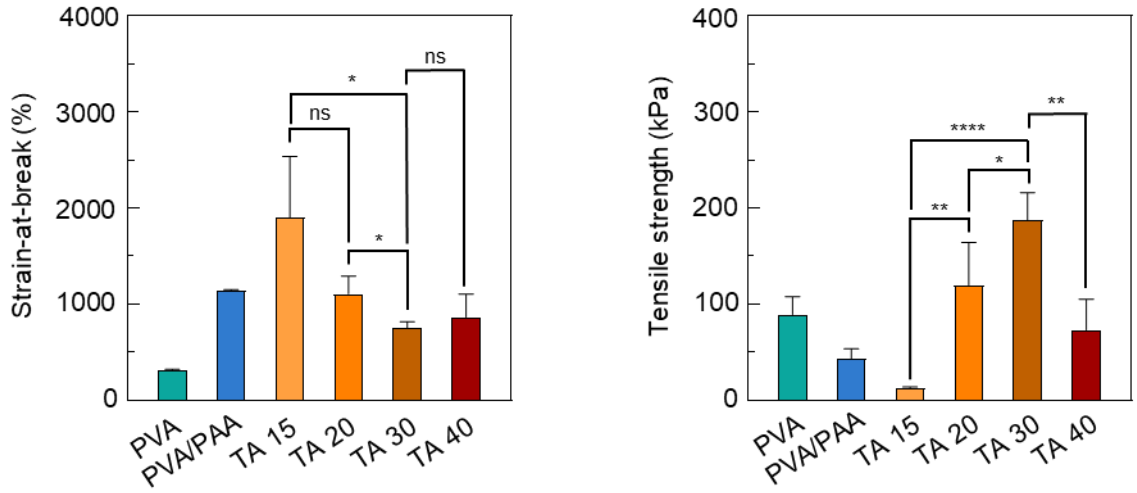

Figure S3. Strain-at-break and maximum tensile strength of PVA, PVA/PAA, and TA/PVA/PAA hydrogels. TA 20 denotes the TA/PVA/PAA hydrogel with a TA concentration of 20% w/v (n = 3, for each group).

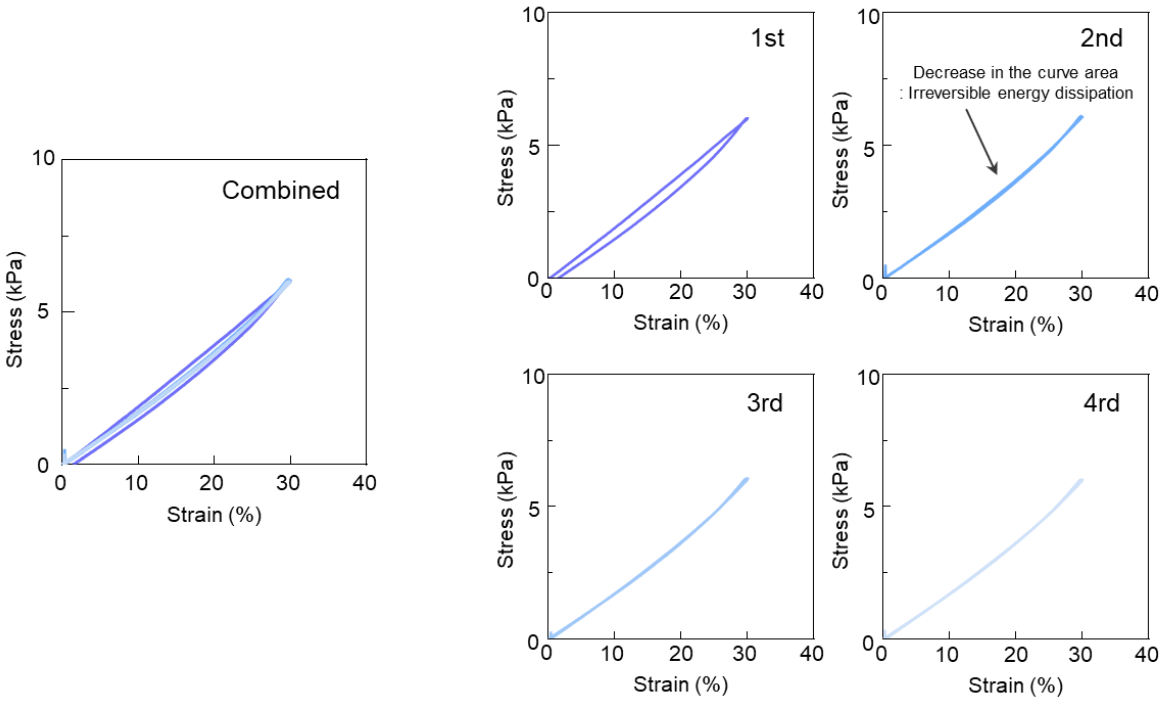

Figure S4. Cyclic loading-unloading test for the PVA/PAA hydrogel.

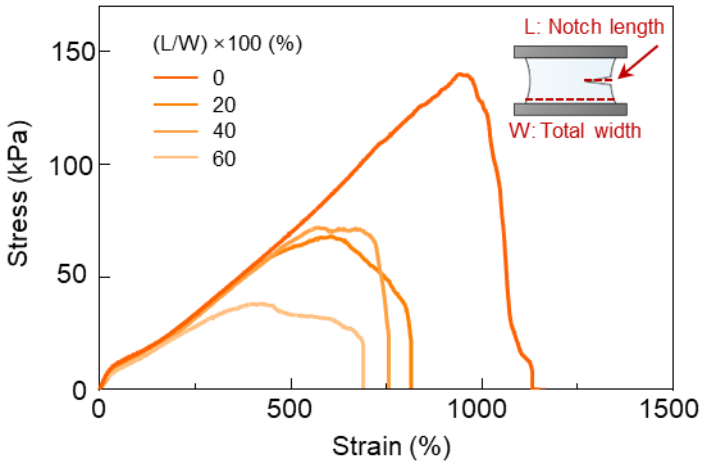

Figure S5. Tensile test curves of the hydrogels with varying notch lengths.

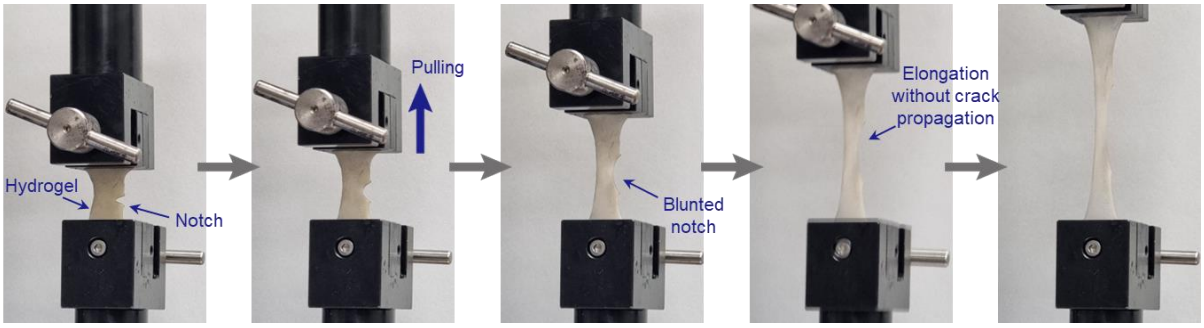

Figure S6. Sequential image showing elongation of the notch-introduced hydrogel.

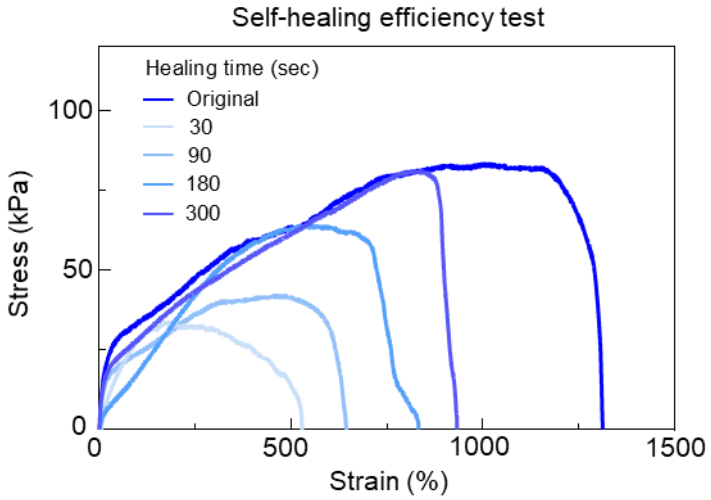

Figure S7. Tensile test curves for the self-healed hydrogels with varying healing times.

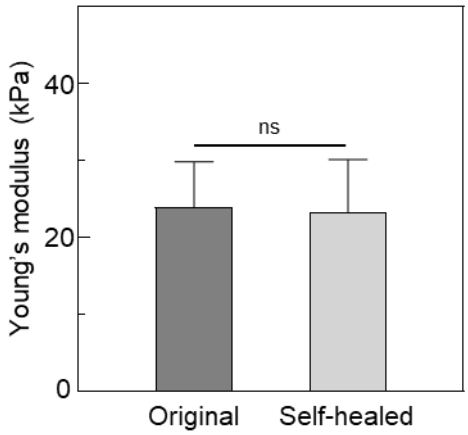

Figure S8. Young's moduli of TA/PVA/PAA hydrogel before and after the self-healing. (n = 3, for each group)

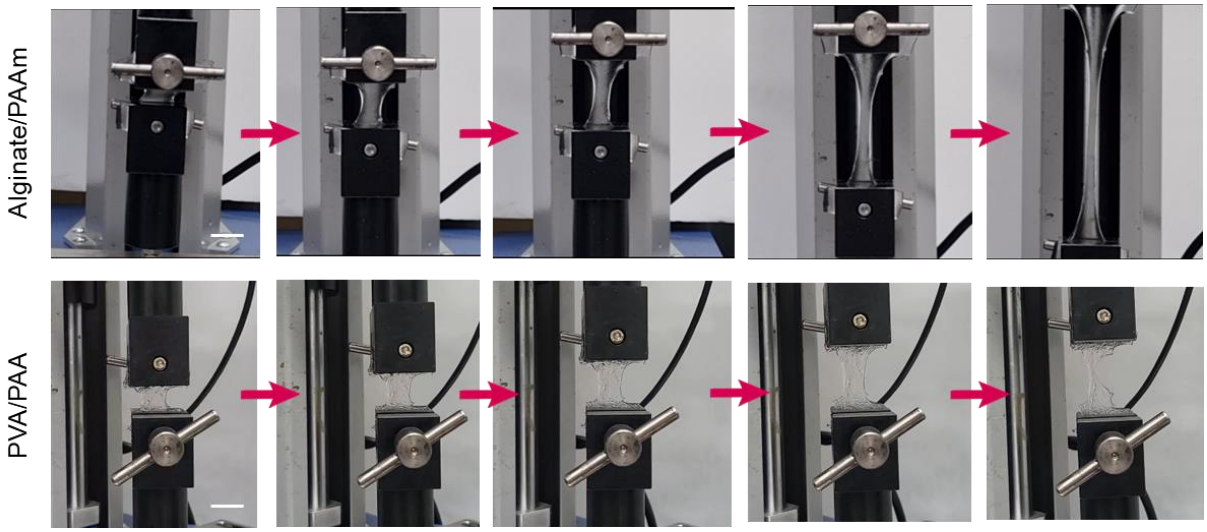

Figure S9. Sequential photographs showing stretching of Alginate/PAAm and PVA/PAA hydrogels (scale bars, 20 mm).

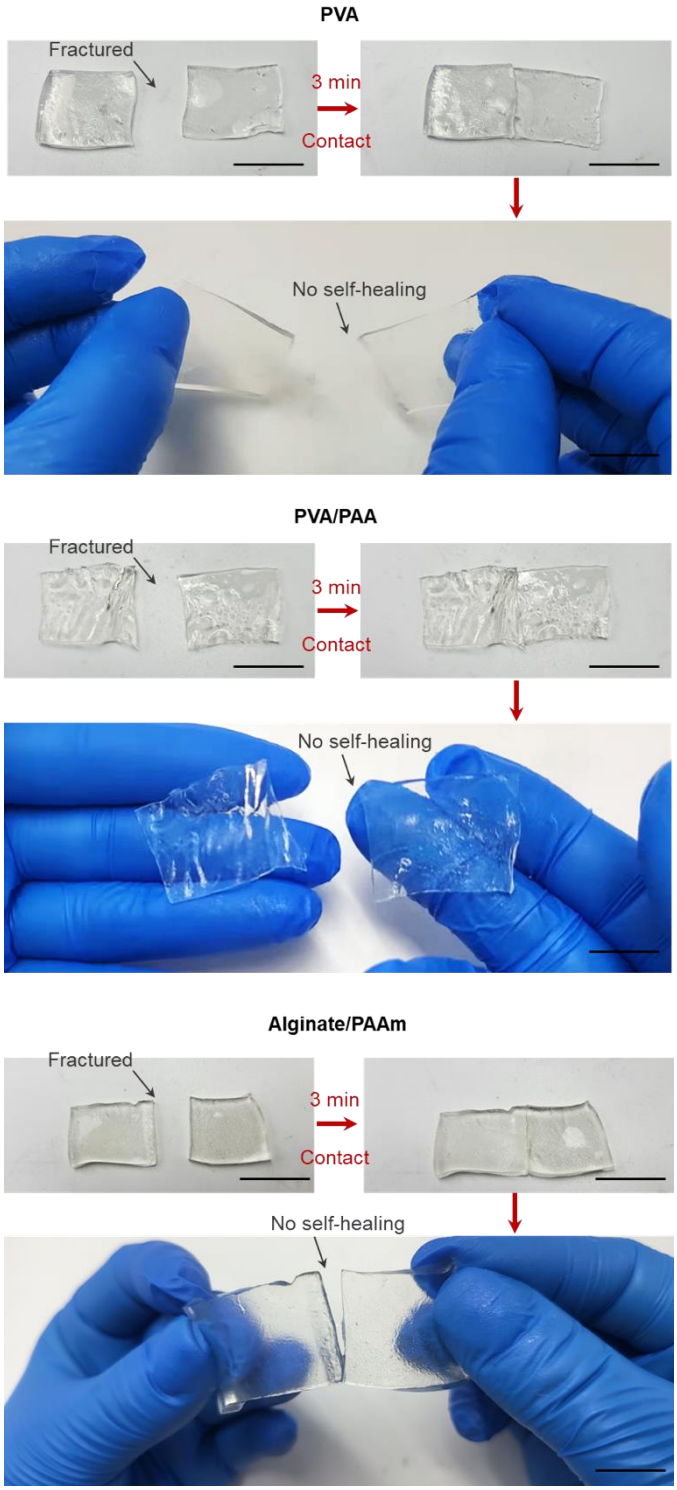

Figure S10. Photographs of PVA, PVA/PAA, and alginate/PAAm hydrogels showing their lack of self-heal ability.

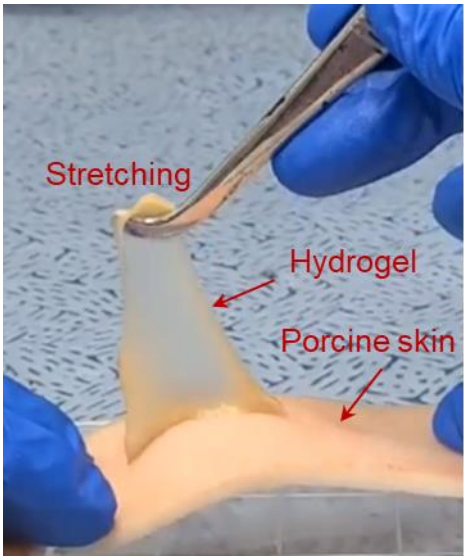

Figure S11. Optical image of the hydrogel tough-bonded to a porcine skin surface.

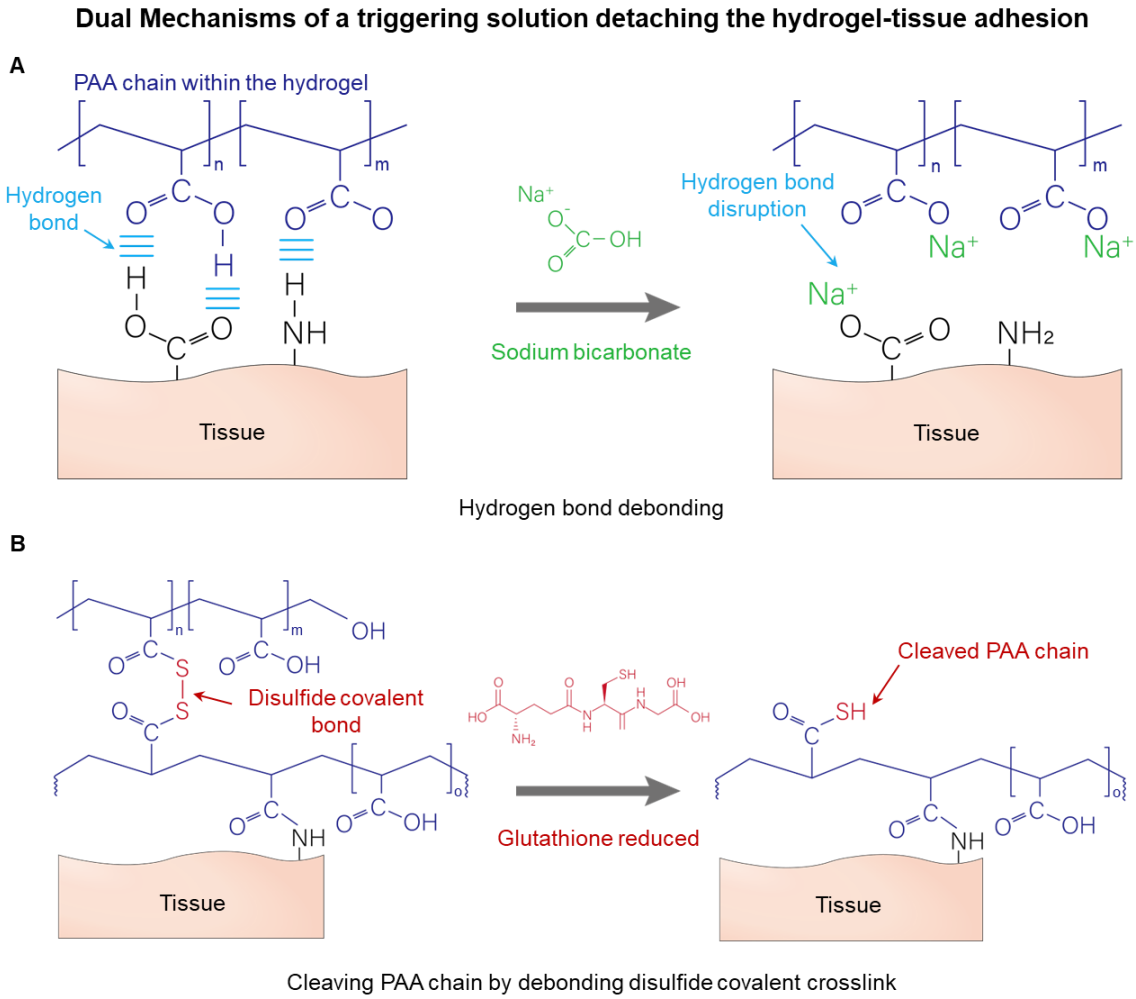

Figure S12. Schematic illustration of the triggering solution detaching the hydrogel from tissue surfaces.

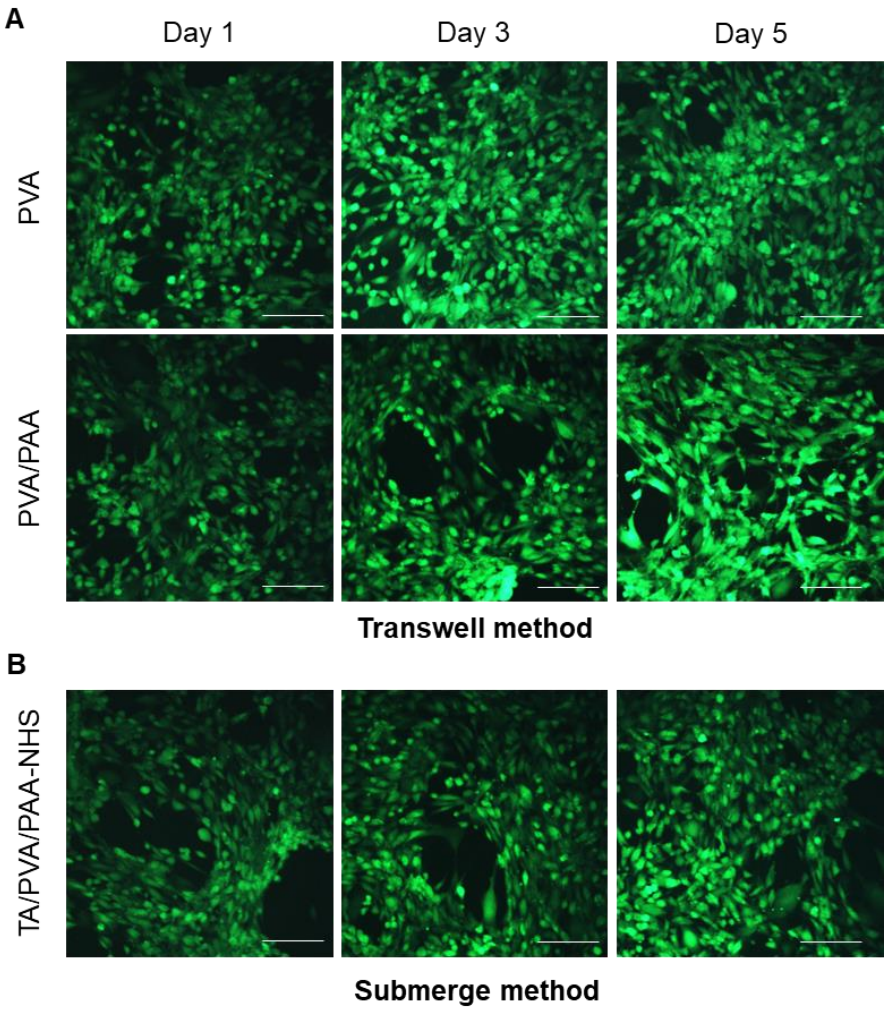

Figure S13. *In vitro* biocompatibility tests on hydrogels. (A) Fluorescence microscopy images of live/dead stainings (green: live, red: dead) on NIH 3T3 cells cultured with PVA and PVA/PAA hydrogels through a transwell system (scale bars, 100 μm). (B) Fluorescence images of live/dead stainings on NIH 3T3 cells directly cultured with submerged TA/PVA/PAA-NHS hydrogel (scale bars, 100 μm).

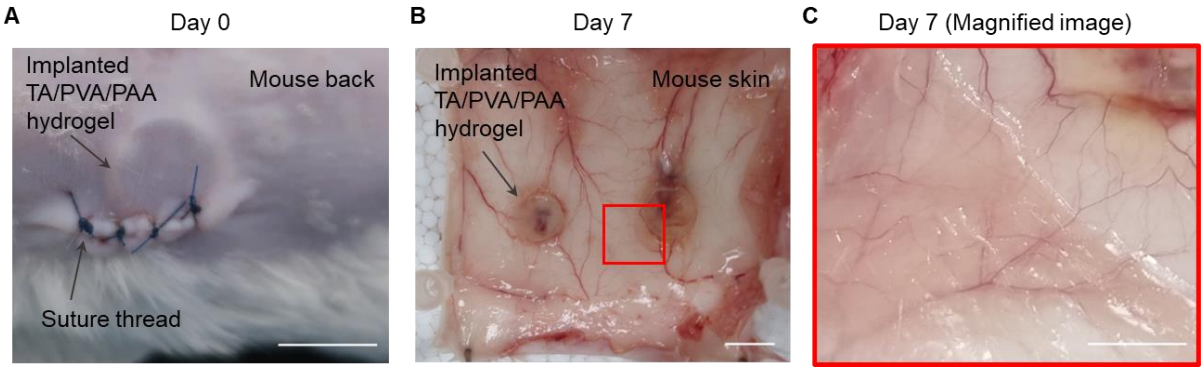

Figure S14. Optical photographs of the hydrogel implanted into a mouse subcutaneous skin. (A) The subcutaneously implanted TA/PVA/PAA hydrogel right after the implantation (scale bar, 0.5 cm). (B) The subcutaneous skin tissue near implanted TA/PVA/PAA hydrogel after seven days of the implantation (scale bar, 5 mm). (C) Magnified photograph image of the subcutaneous skin tissue adjacent to the implanted hydrogel (scale bar: 5 mm)

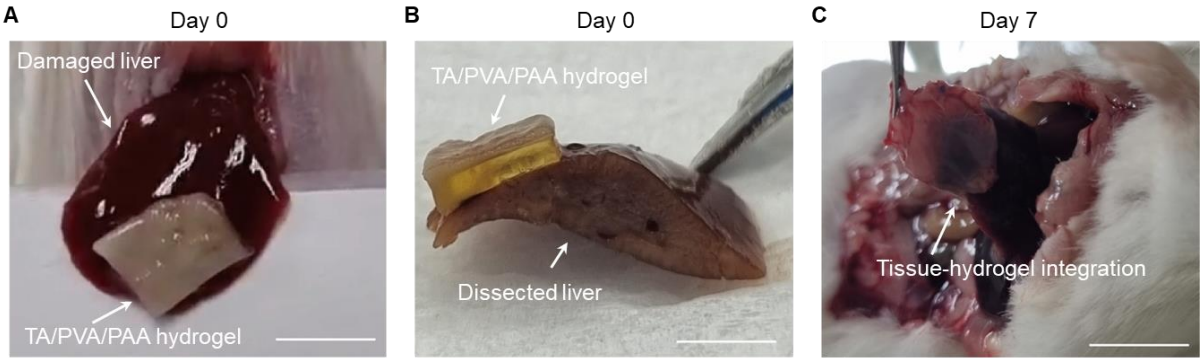

Figure S15. Photographs of the TA/PVA/PAA hydrogel adhered to liver tissue. (A) The TA/PVA/PAA hydrogel covering the bleeding site of the liver (scale bar, 5 mm). (B) The dissected hydrogel-attached liver (scale bar, 5 mm). (C) The hydrogel integrated with the liver tissue after seven days of the application (scale bar, 5 mm).

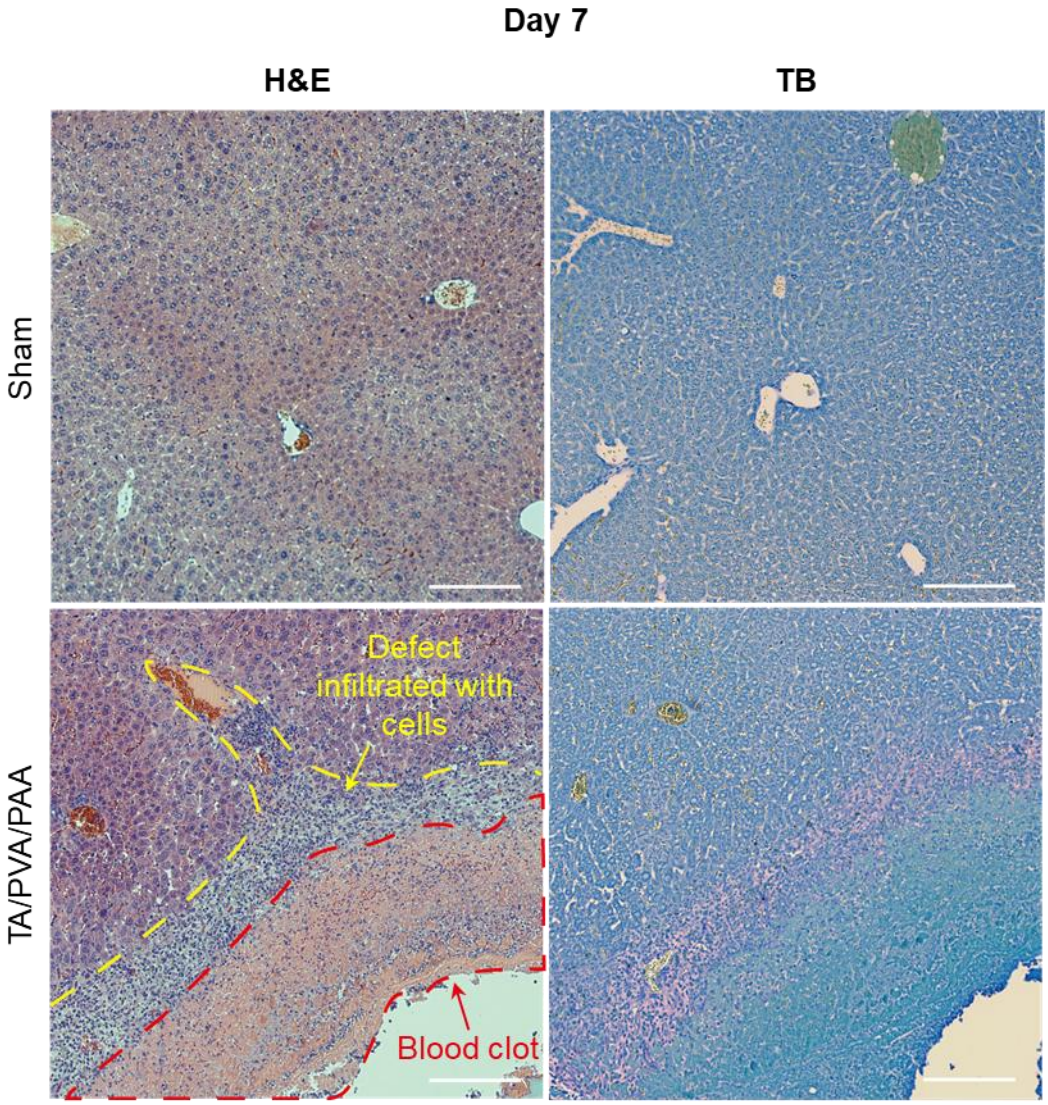

Figure S16. Histological images of the liver tissue of the sham group and where the TA/PVA/PAA group (scale bar: 200 μm). For the TA/PVA/PAA group, the tissue site where hemostasis was induced was stained. A yellow dashed line indicates a defect region that was formed by a needle puncture. A red dashed line signifies a blood clot structure.