

## Supporting Information

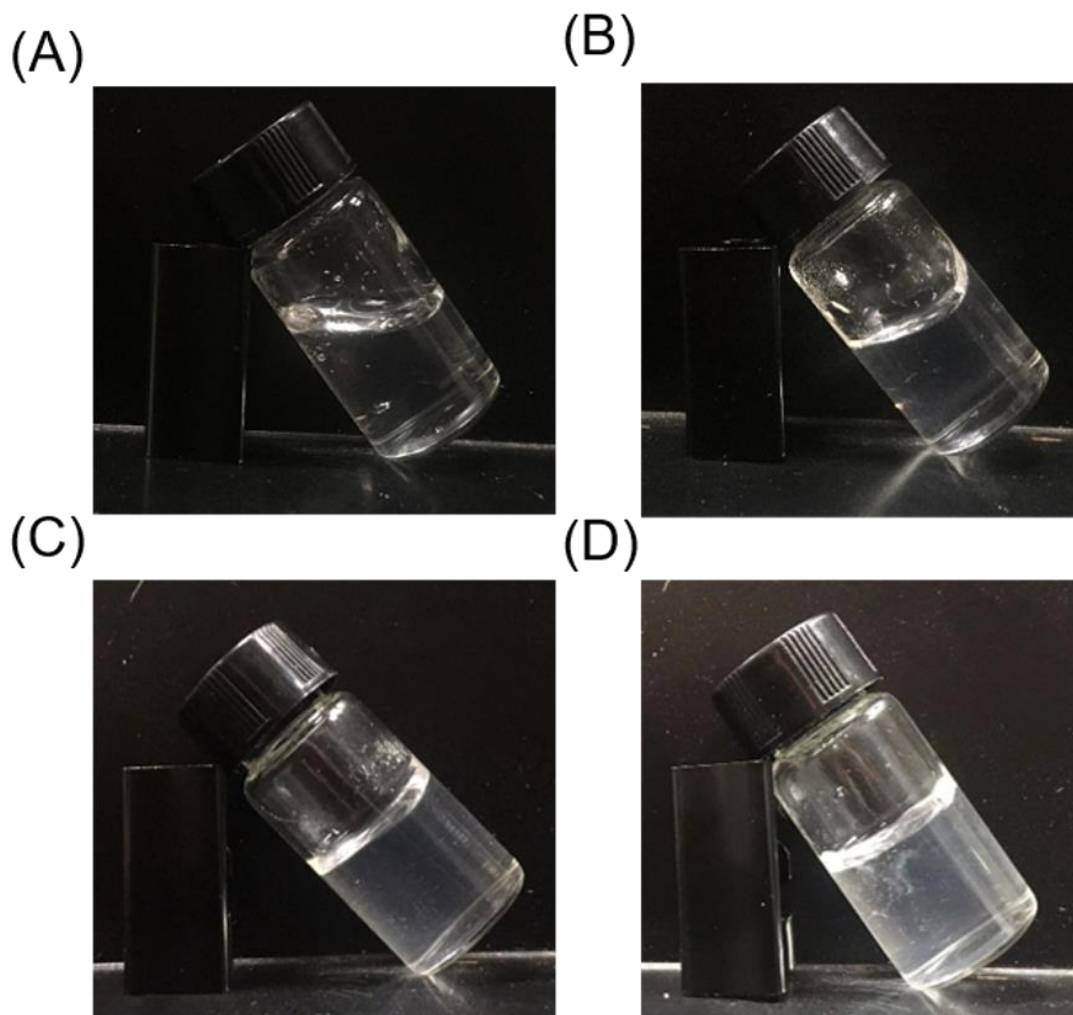
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Multifunctional Oxidized Dextran–Metformin as a Tissue-Adhesive Hydrogel to Prevent Postoperative Peritoneal Adhesions in Patients with Metabolic Syndrome

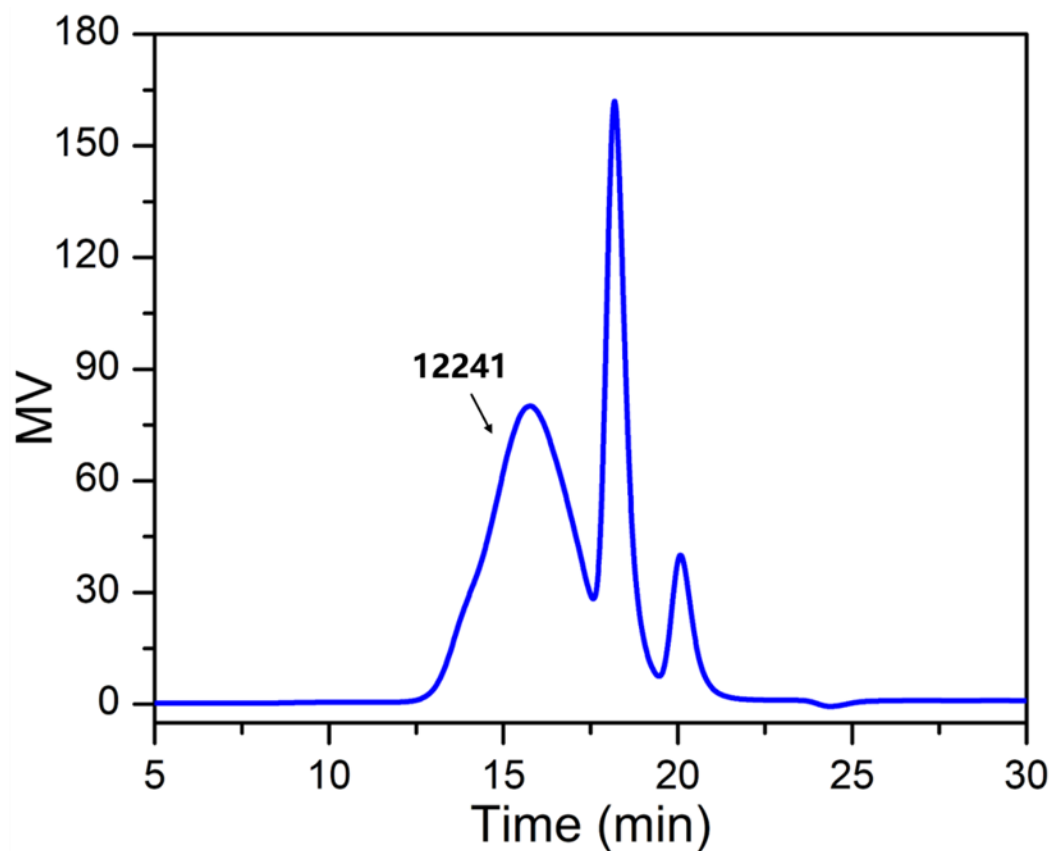
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Table S1. Scoring system of mouse ischemic button model

Score	Description
0	No visible adhesion to the ischemic button, with limited mesothelial thickening on the button.
1	A string adhesion to the ischemic button.
2	Direct attachment of one area of an organ to the ischemic button, the adhesion contact itself was light and usually involved contact between the peritoneum and an abdominal organ.
3	Direct attachment of two non-continuous areas of one organ or two areas of two organs to the ischemic button, usually between the peritoneum and two abdominal organs or two distinct, noncontinuous areas of a single organ.
4	Direct attachment of three or more non-continuous areas to the ischemic button, usually between the peritoneum and three abdominal organs, or multiple separate areas of one or two organs.
5	Full compaction/encapsulation of the abdominal organs, most organs were adhered to the peritoneum as well as to each other as a single, rigid mass.



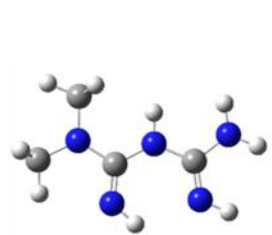
**Figure S1.** Pictures of ODE-ME in aqueous solution at concentrations of (A) 5 wt%, (B) 10 wt%, (C) 15 wt%, and (D) 20 wt%.



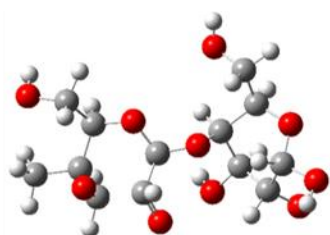
**Broad Unknown Relative Peak Table**

	Distribution Name	Mn (Daltons)	Mw (Daltons)	MP (Daltons)	Mz (Daltons)	Mz+1 (Daltons)	Polydispersity	Mz/Mw	Mz+1/Mw
1		9757	21133	12241	44466	70071	2.165924	2.104121	3.315759

**Figure S2. Gel Permeation Chromatography (GPC) chromatogram of ODE-ME hydrogel.**



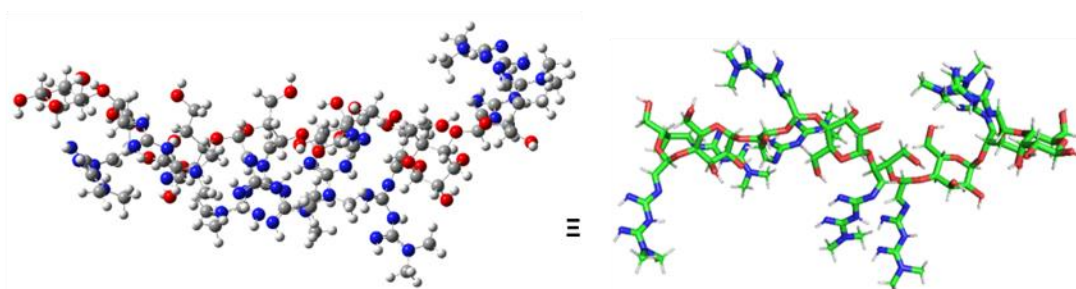
Metformin (**ME**)



Oxidized dextran (**ODE**)

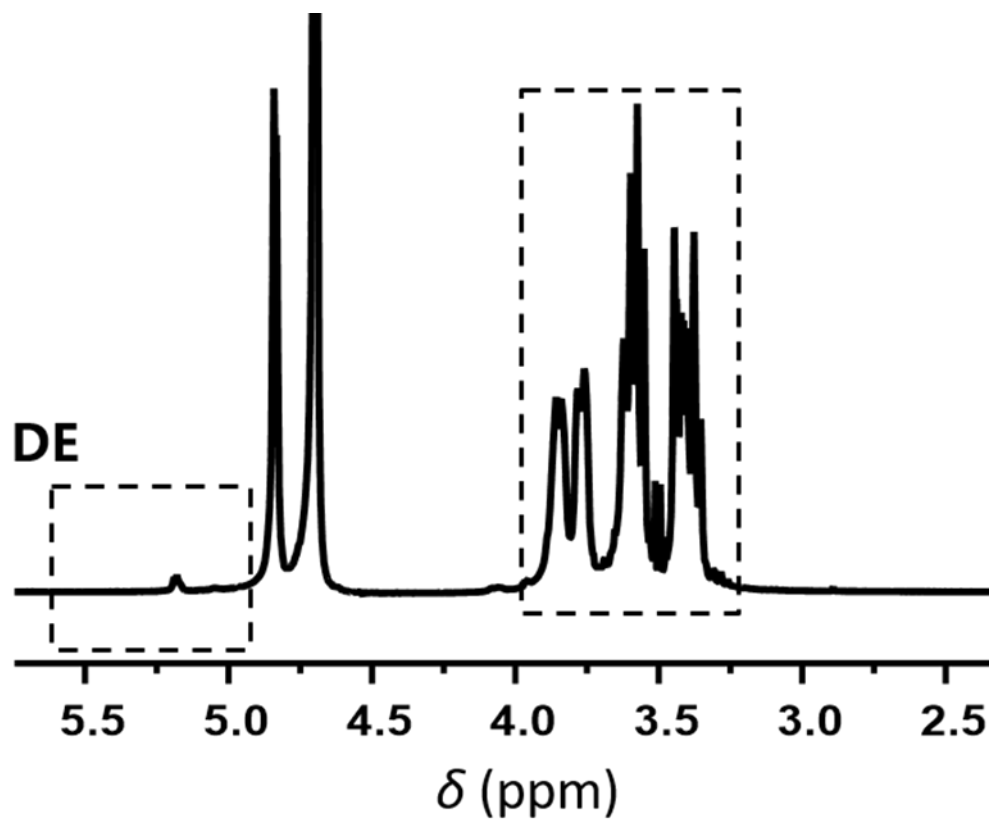


**ODE-ME** monomer

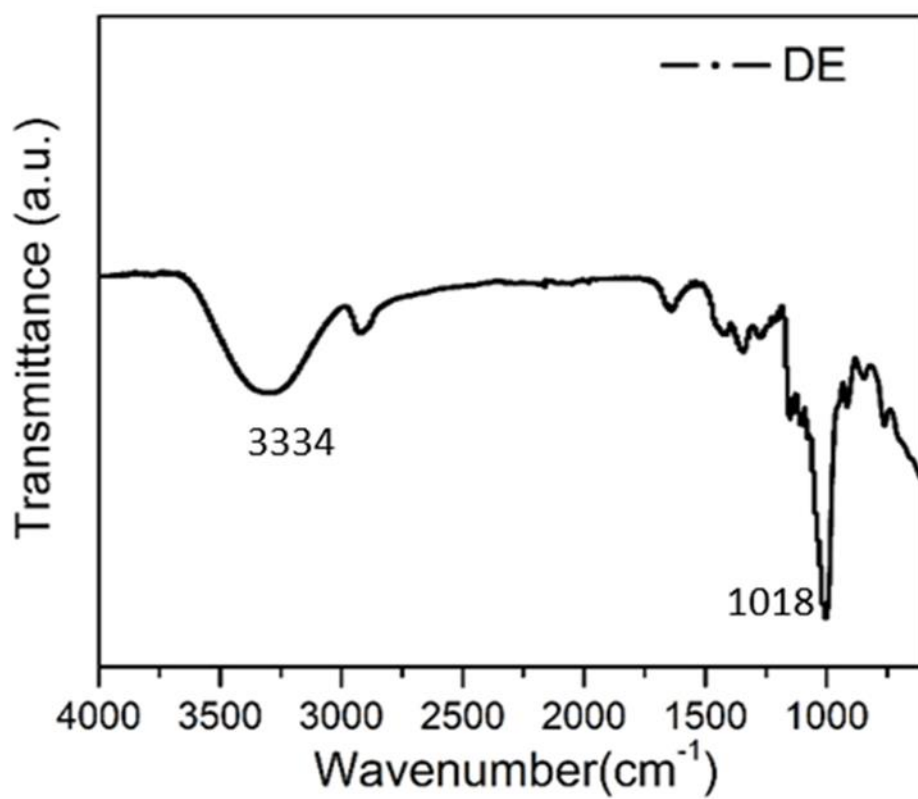


**ODE-ME** (n=7)

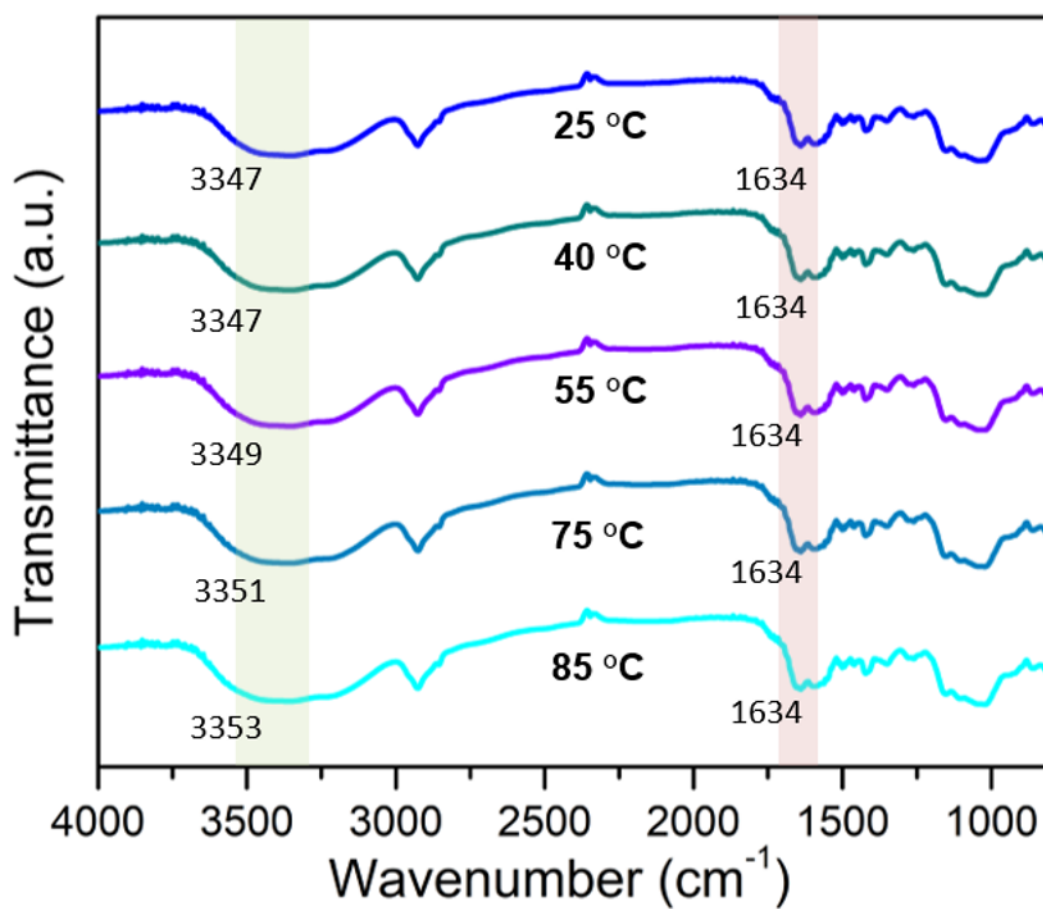
**Figure S3.** Molecular structure of ODE-ME molecular fragment.



**Figure S4.** <sup>1</sup>H NMR spectra of the DE molecular.

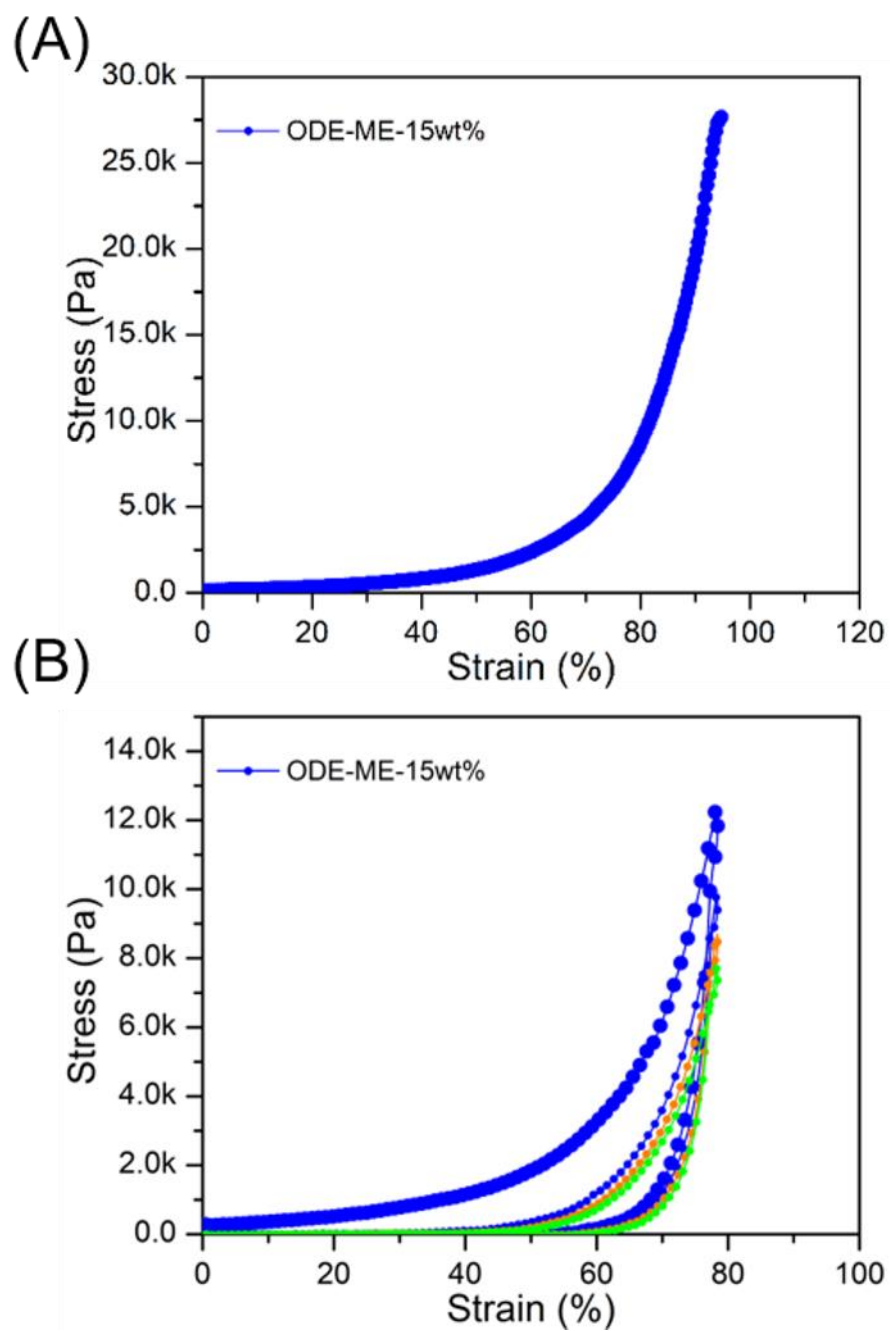


**Figure S5.** FT-IR spectra of the DE molecular.

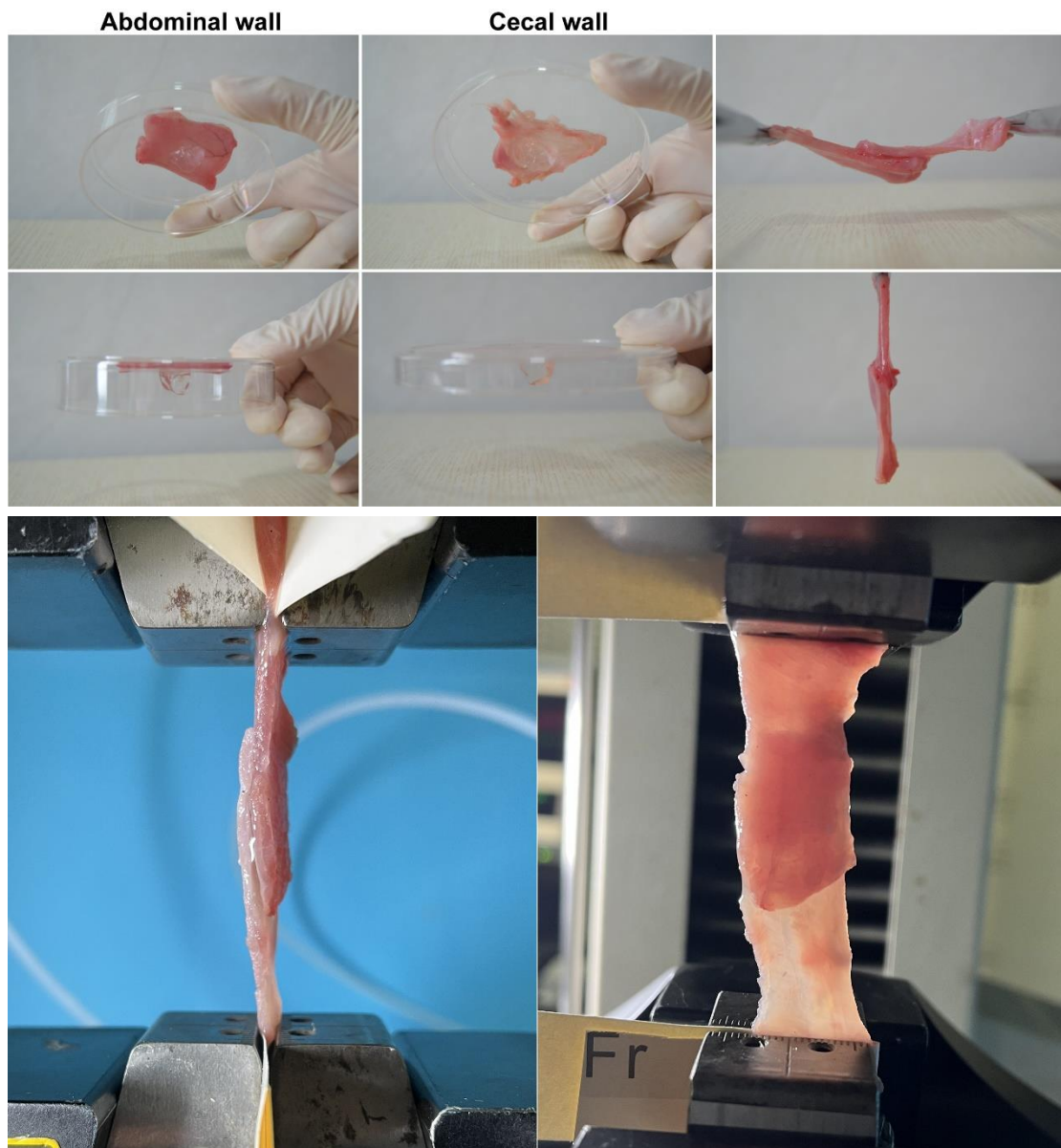


**Figure S6.** Variable-temperature FTIR spectroscopy of ODE-DE samples.

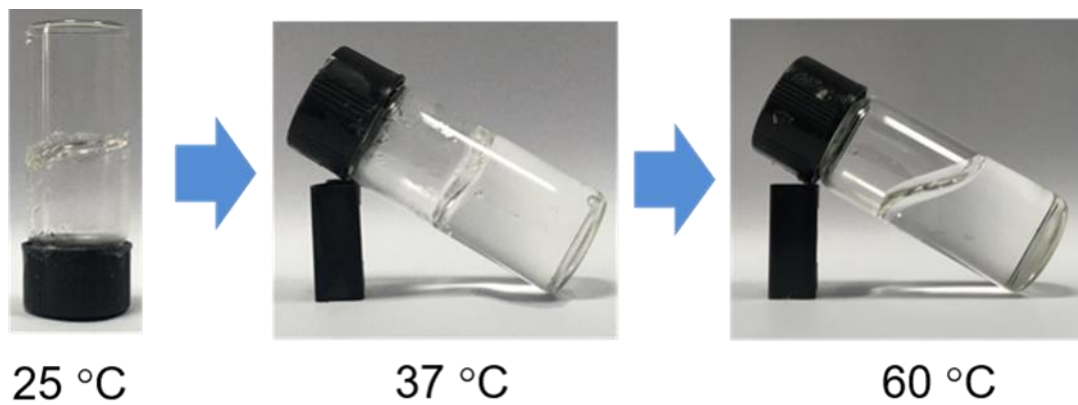




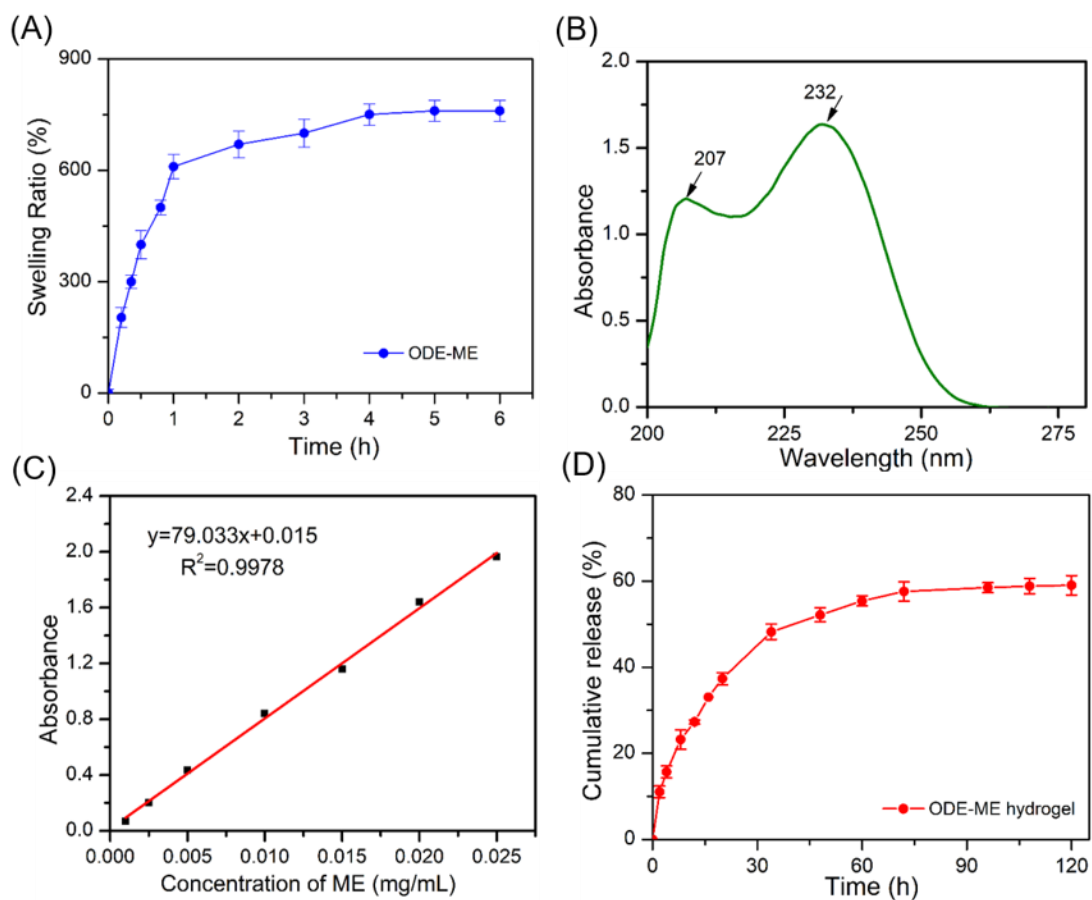
**Figure S7.** (A) Stress-strain curves and (B) continuous loading-unloading tests of ODE-DE -15wt% hydrogels in compression.



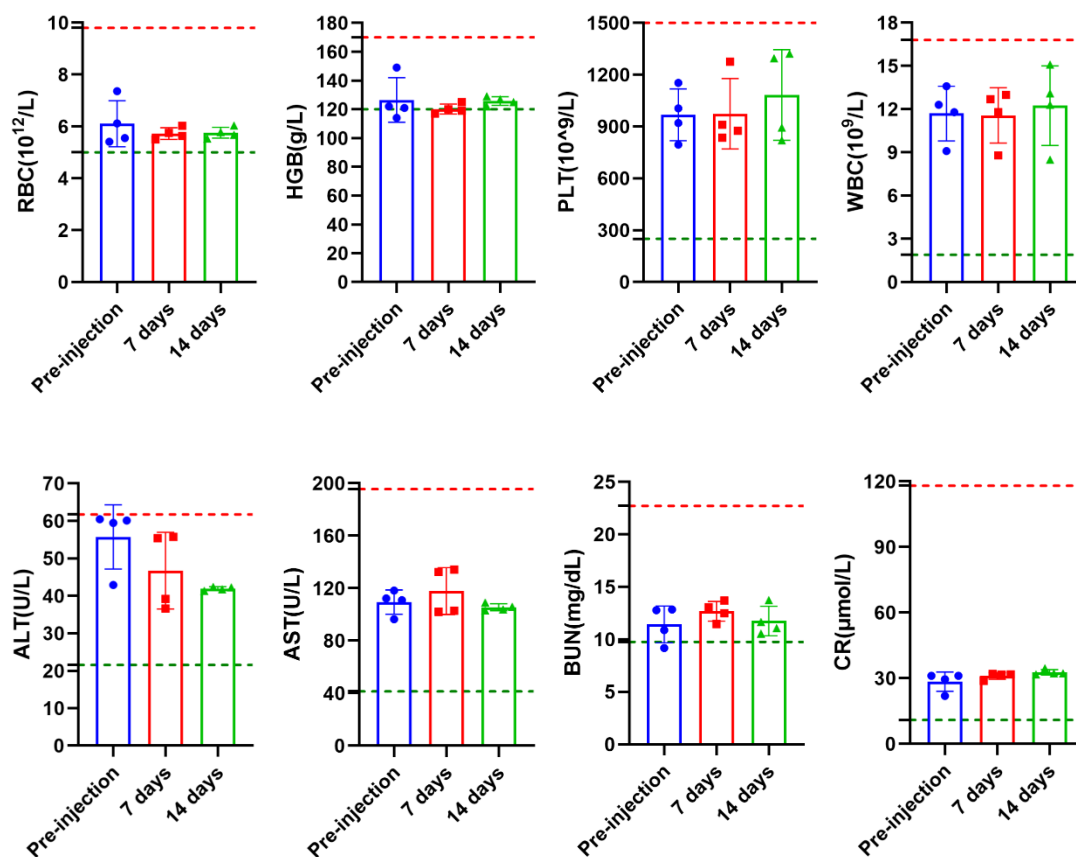
**Figure S8.** Tissue-adhesive and lap shear test of ODE-ME hydrogels.



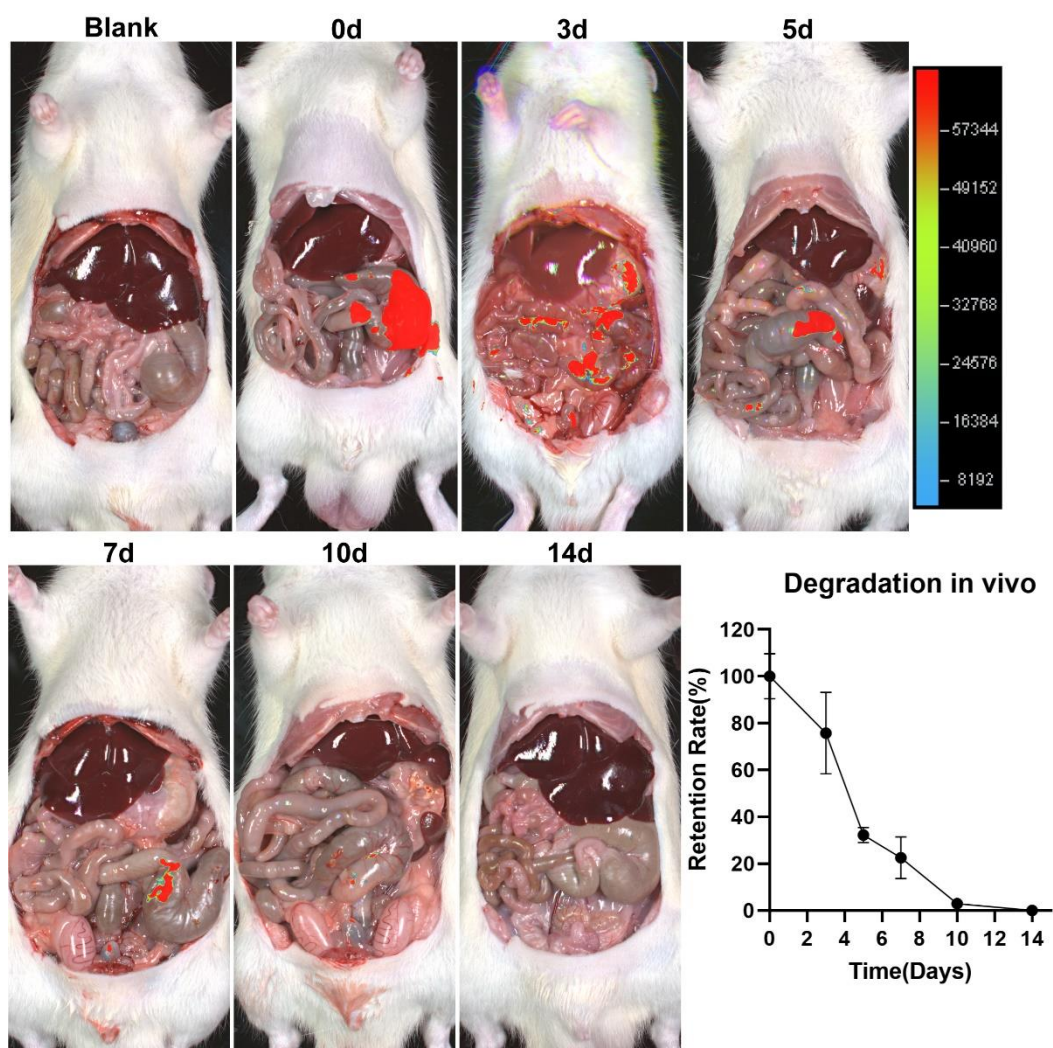
**Figure S9.** ODE-ME hydrogels at different temperatures.



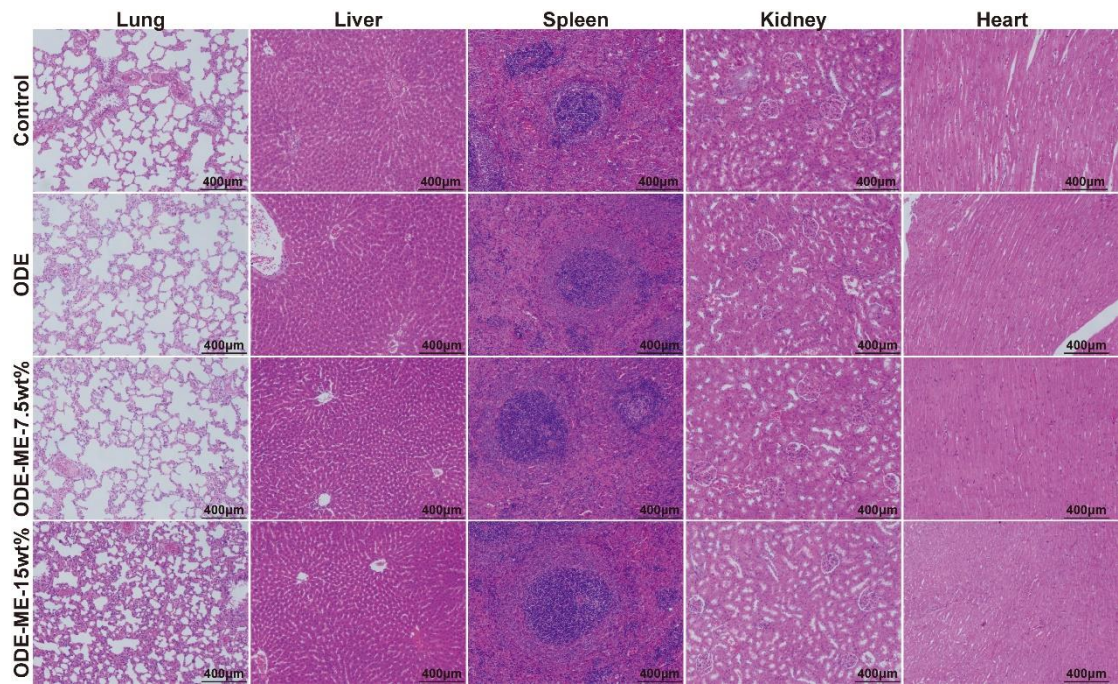
**Figure S10.** (A) Swelling test of hydrogels. (B) UV-absorption pattern of metformin. (C) Standard curve of ME, as constructed using a series of known ME concentrations in PBS solution. (D) Releasing behavior of the ODE-ME hydrogel.



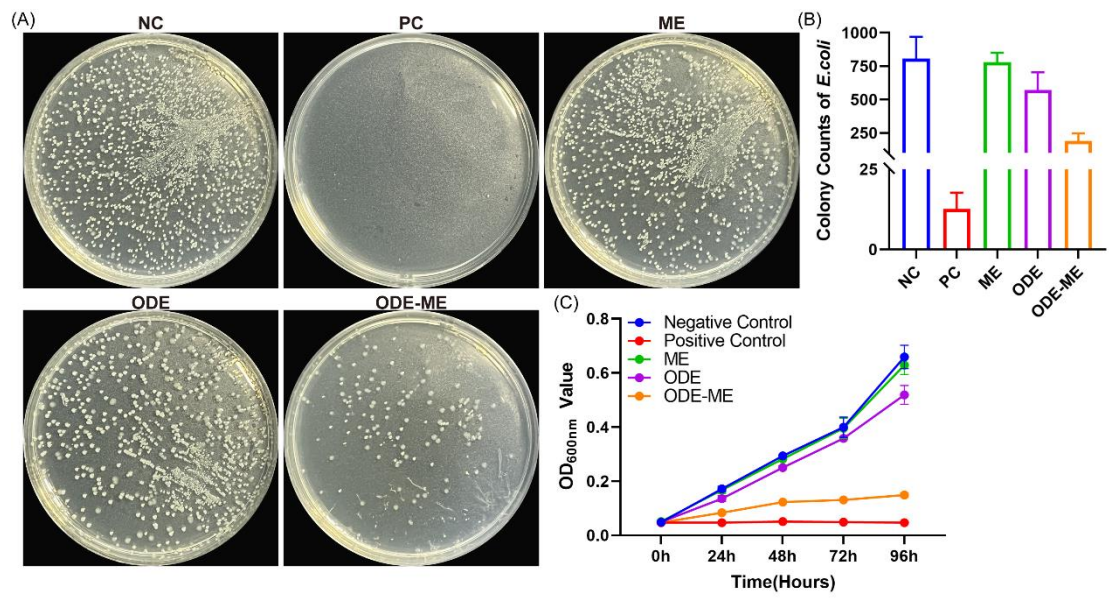
**Figure S11.** Blood biochemical examination and routine examination results of rats after intraperitoneal injection of ODE-ME-15wt% hydrogels (n = 4). The red dotted lines represent the upper limit of normal physiological values. The green dotted lines represent the lower limit of normal physiological values. WBC: White Blood Cells, PLT: Platelets, RBC: Red Blood Cells, HGB: Hemoglobin, ALT: Alanine aminotransferase, AST: Aspartate aminotransferase, BUN: Blood Urea Nitrogen, CR: Creatinine.



**Figure S12.** Representative images of *in vivo* imaging at different time points after FITC-labeled ODE-ME-15wt% hydrogel was injected into the abdominal cavity and Quantitative statistical analysis of the degradation rate (n = 3).

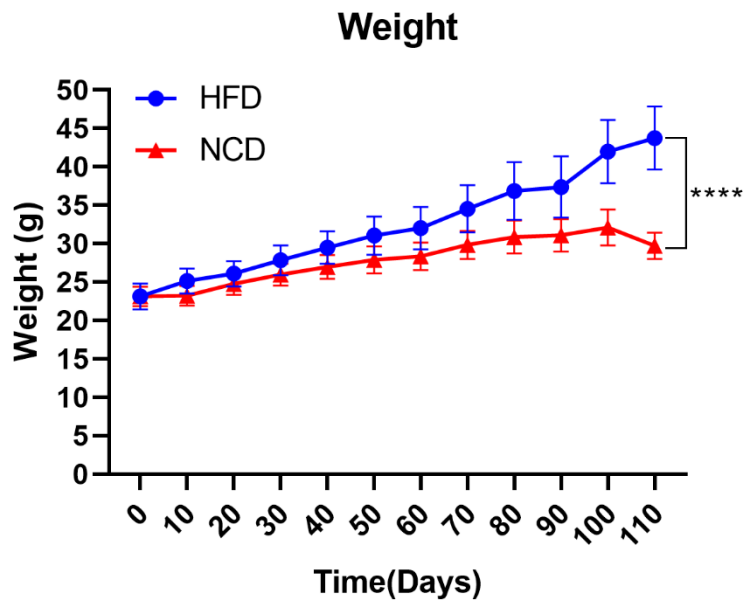
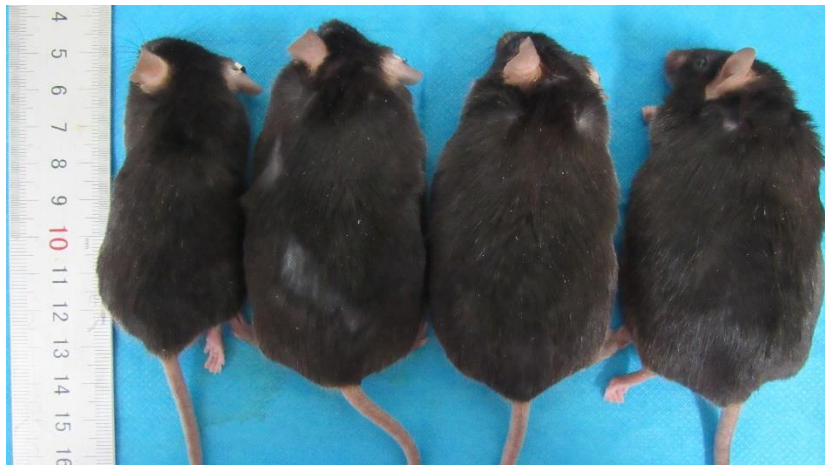


**Figure S13.** H&E staining results to evaluate the effects of ODE-ME hydrogels on heart, liver, spleen, lung, and kidney.

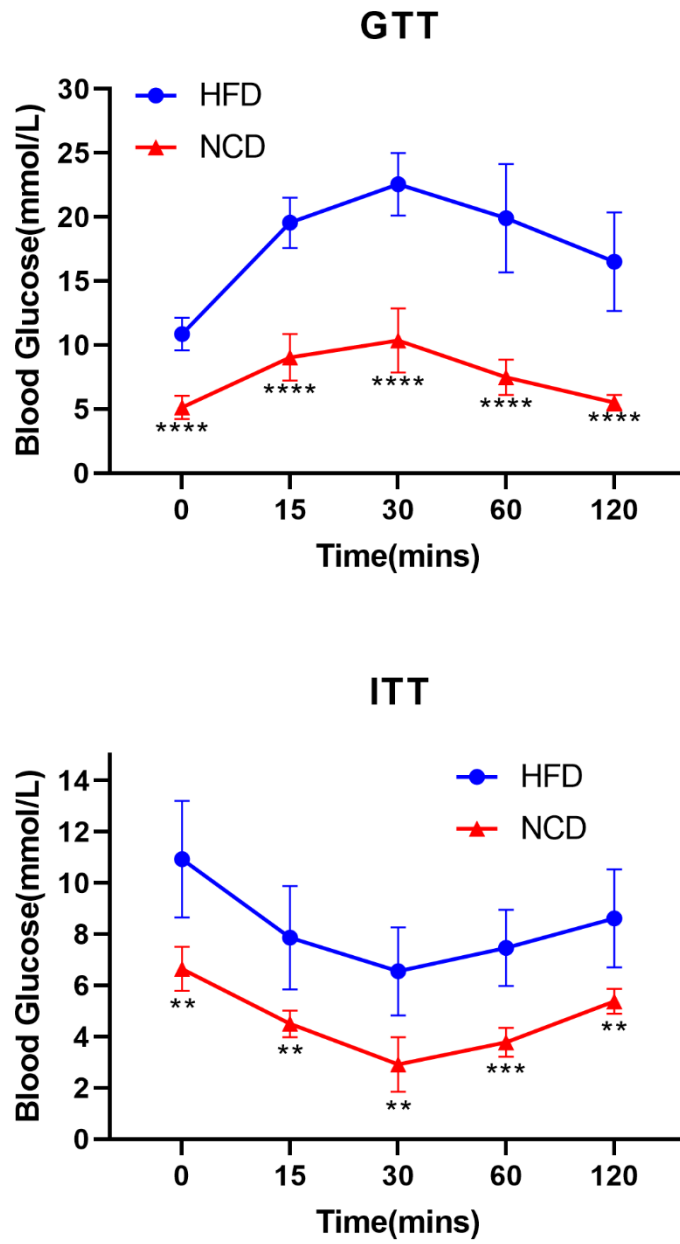


**Figure S14.** (A) Representative display pictures and (B) quantitative statistical data of ODE-ME hydrogels anti-*E.coli* test (n = 3). (C) Time-dependent antibacterial test toward *E.coli* (n = 3).

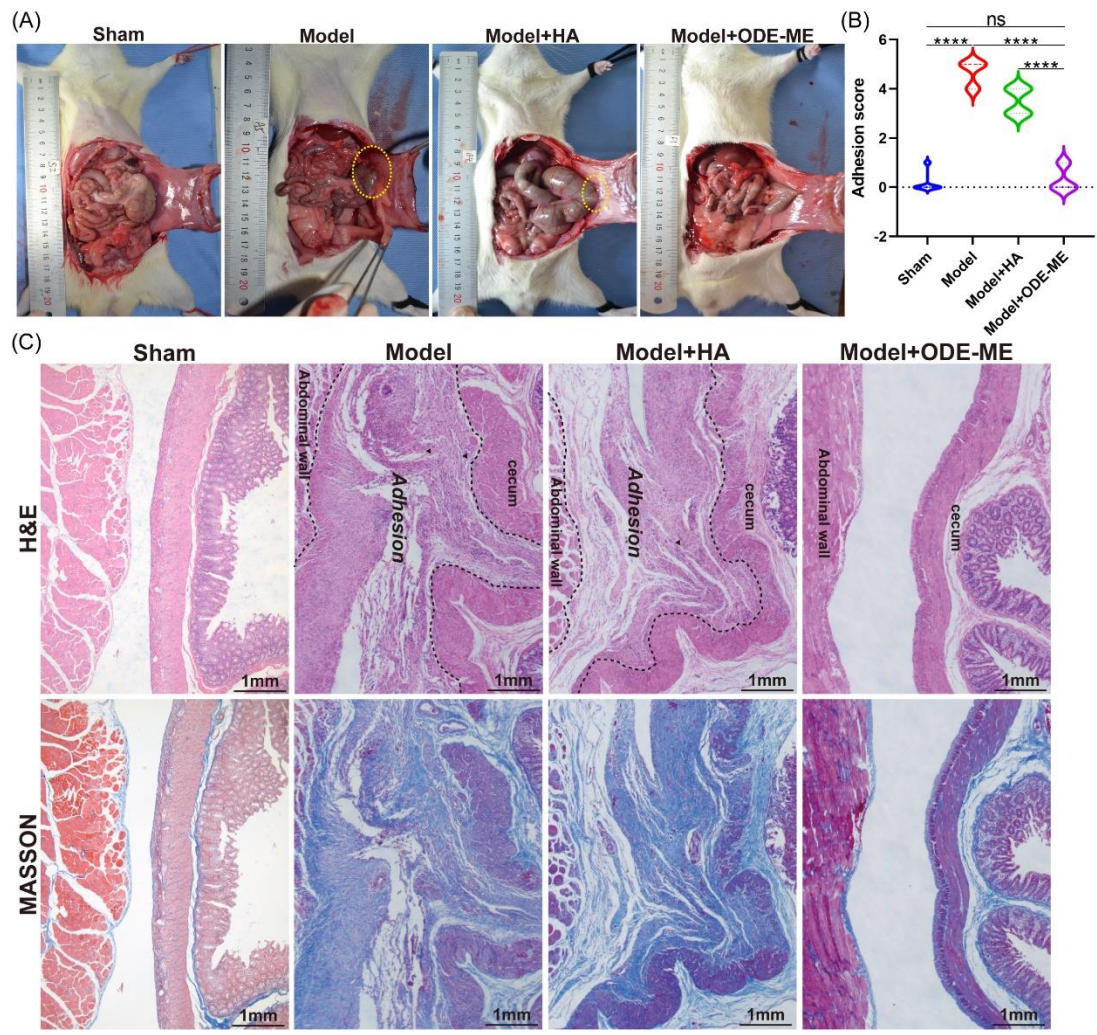




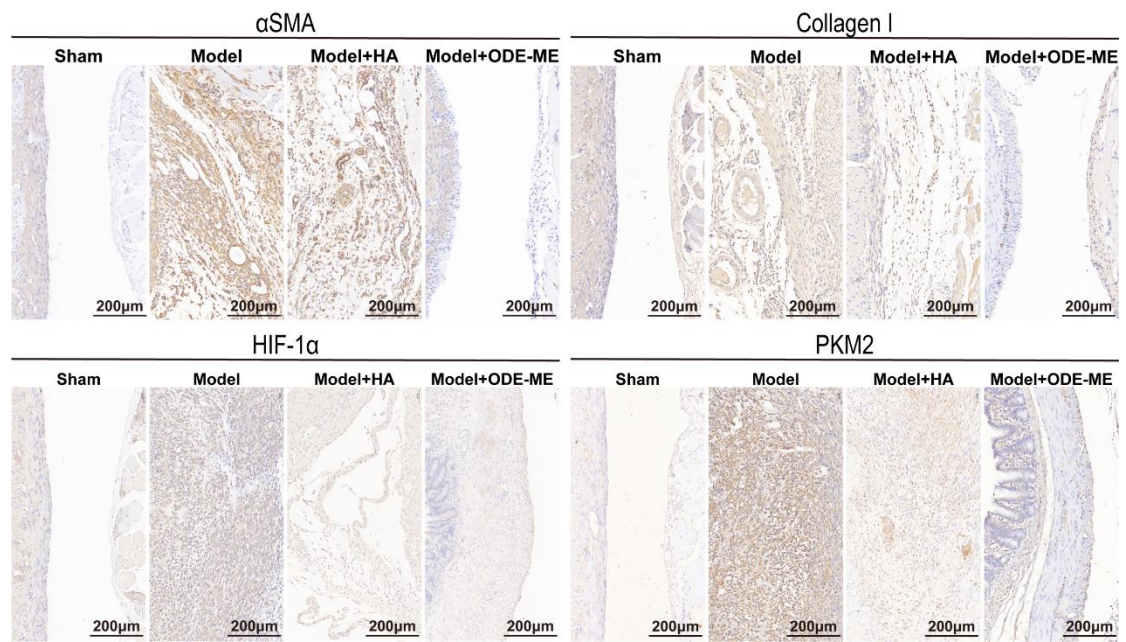
**Figure S15.** General photographs of mice after NCD and HFD feeding and Body weight changes.



**Figure S16.** Glucose tolerance tests (GTTs) and insulin tolerance tests (ITTs) results of mice fed with NCD and HFD (n = 6).



**Figure S17.** Prevention of cecum abrasion-sidewall defect by the ODE-ME hydrogel in the adhesion model. (A) Representative photographs of postoperative peritoneal adhesions on day 7 and (B) adhesion scores of different groups (n = 6). (C) Results of representative H&E staining and Masson staining of each group on day 7 after the first surgery.



**Figure S18.** Representative images of IHC staining of  $\alpha$ SMA, Collagen I, HIF1 $\alpha$  and PKM2 on day 7 after the first surgery.