Supporting Information

Biomimetic Scaffolds with Programmable Pore Structures for Minimum Invasive Bone Repair

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Supplemental table: Table S1
Supplemental Fig.s: Fig. S1 Fig. S13
Supplemental videos: Movie S1 Movie S2

Table S1. Enthalpies of porous composite scaffolds.

Samples	T_c (°C)	**Onset Temperature (°C)**	**Offset Temperature (°C)**	T_m (°C)	ΔH ($J \cdot g^{-1}$) [b]
PCT	-19.46	-12.15	34.14	18.6	-12.15
PCTHA10	-26.04	-1.09	44.86	23.68	-24.80
PCTHA20	-26.12	1.41	23.68	21.77	-25.13
PCTHA30	-22.12	-12.36	34.98	17.12	-14.66
PCTHA40	-26.45	-23.37	21.27	3.77	-7.27

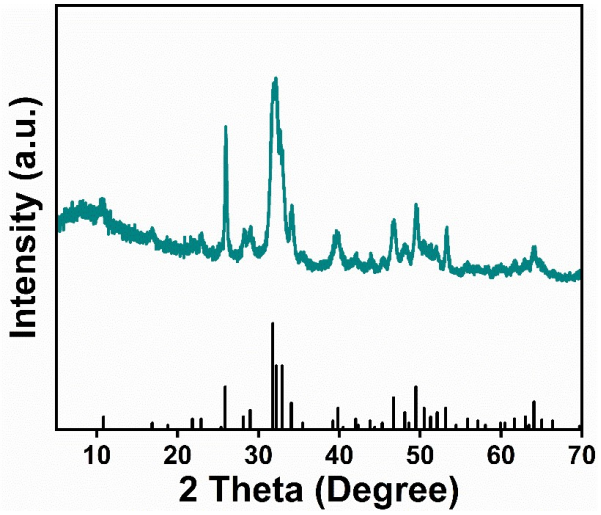

Fig. S1. XRD pattern of HA.

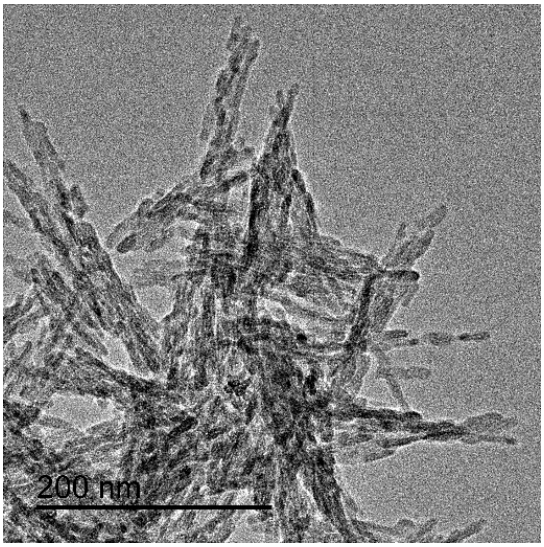

Fig. S2. TEM image of HA powder.

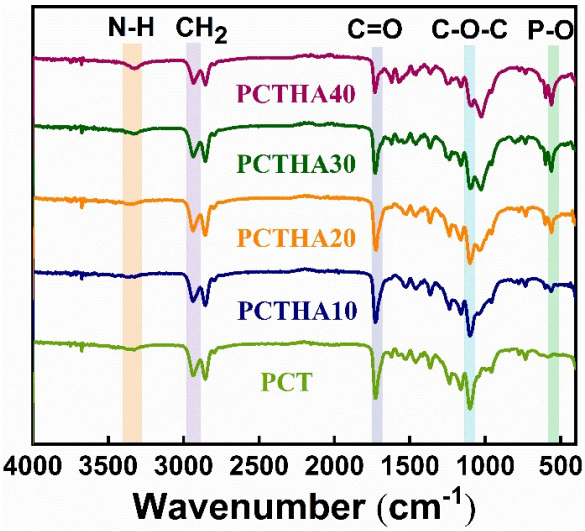

Fig. S3. Characterization of PCTHAx by FT-IR. All composite scaffolds present characteristic peaks in common including N-H stretching at 3332 cm^{-1}, asymmetric C-H stretching at 2936 cm^{-1}, symmetric C-H stretching at 2860 cm^{-1}, C=O stretching at 1725 cm^{-1}, C-O-C group at 1100 cm^{-1}, P-O bond absorption peaks at 1028 cm^{-1} and 562 cm^{-1}. The formation of polyurethane was confirmed by the characteristic absorption peak of C-N at 1462 cm^{-1}, while there was no obvious characteristic absorption peak at 2260-2280 cm^{-1}, indicating that HDI reacted adequately with the matrix material.

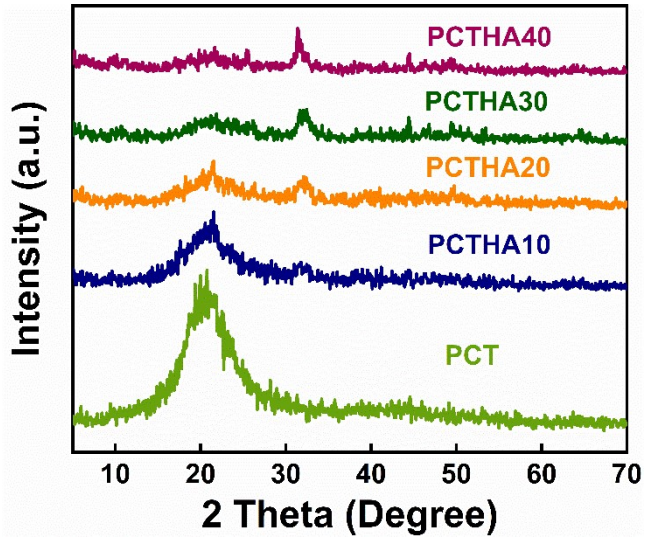

Fig. S4. XRD patterns of PCTHAx. The composite scaffold has only one amorphous peak around 20° and the main peak of HA was gradually revealed at 32°.

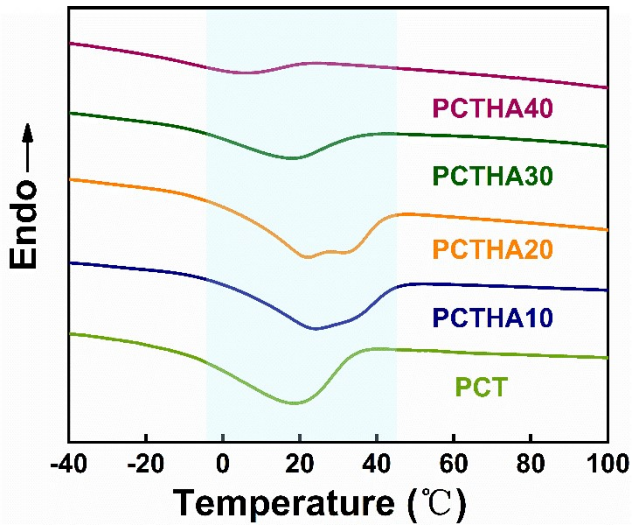

Fig. S5. The second heating curve of PCTHAx. The melting temperature of PCTHA10 increased from 18.61 °C to 23.68 °C compared to pure PCT, on the one hand because the presence of HA limited the micro-Brownian motion of the polymer molecular chains, and on the other hand because the physical interaction between HA and the matrix material provided a higher thermal transition temperature for the polymer. While the melting temperature of PCTHA20, PCTHA30 and PCTHA40 gradually decreased from 21.77 °C to 17.12 °C and finally to 3.77 °C. This was due to the high HA content, which reduced the crystallization of the composites and led to a lower melting temperature.

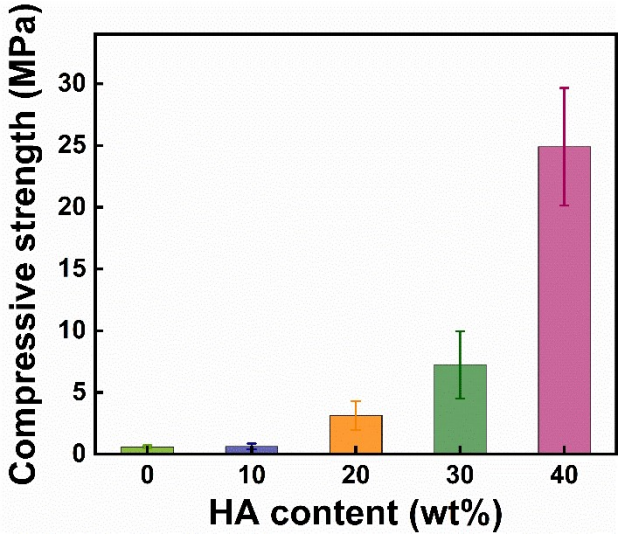

Fig. S6. Compressive strength of the PCTHAx. Dispersion and adhesion between HA and matrix material resulted in a gradual increase in the compressive strength of the

composite scaffold.

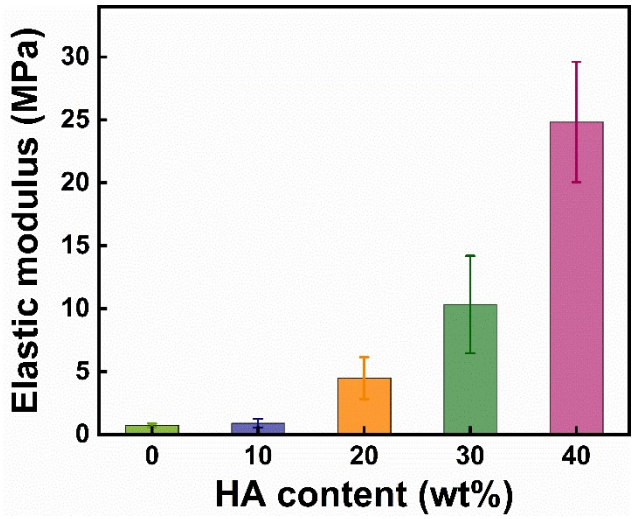

Fig. S7. Elastic modulus of the PCTHAx.

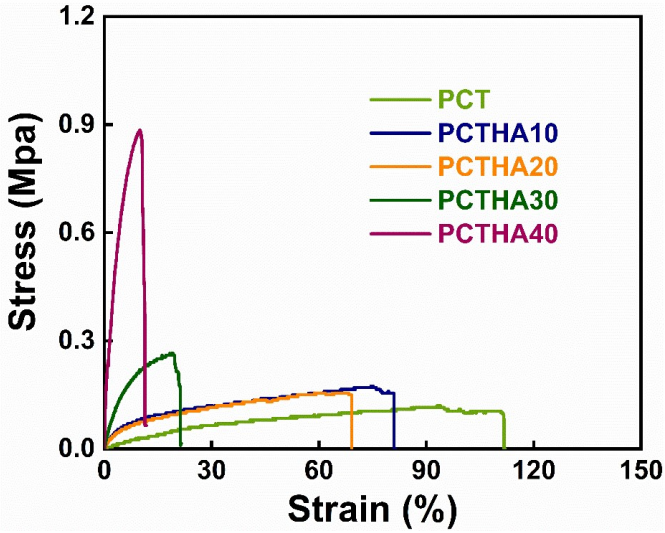

Fig. S8. Stress-strain curves for PCTHAx scaffolds.

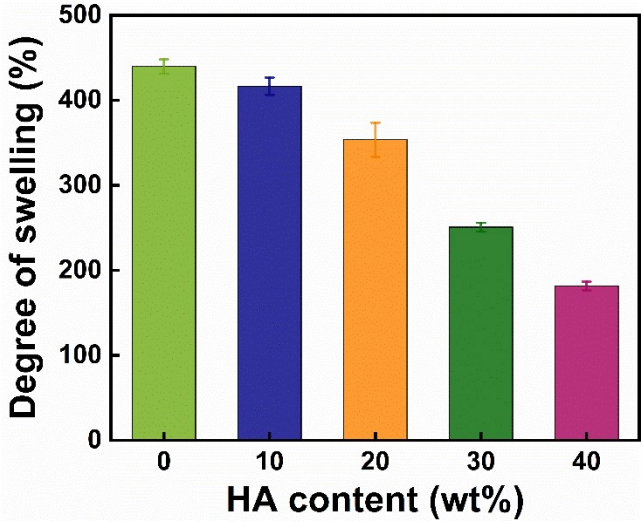

Fig. S9. Swelling degree of PCTHAx. The swelling of PCT, PCTHA10, PCTHA20, PCTHA30 and PCTHA40 after 24 hours of immersion in ethyl acetate was 439.7%, 416.6%, 353.6%, 250.8% and 181.8% respectively. The decrease in swelling with increasing HA was caused by the tight junctions between HA and the molecular chains.

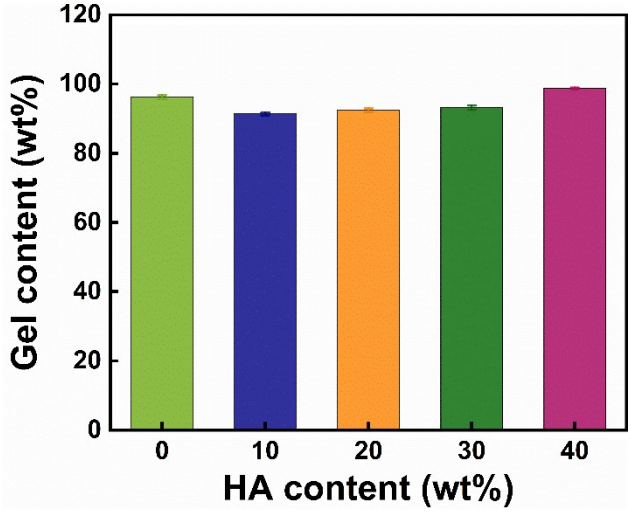

Fig. S10. Gel content of PCTHAx.

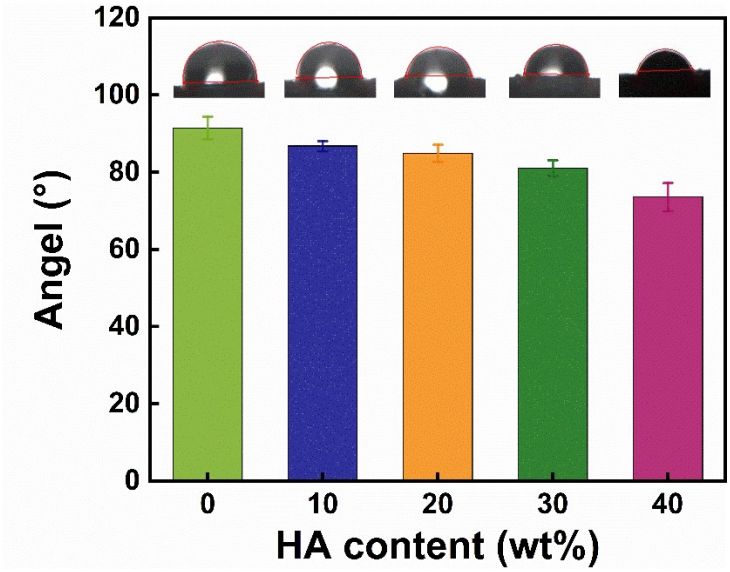

Fig. S11. Water contact angles of PCTHAx.

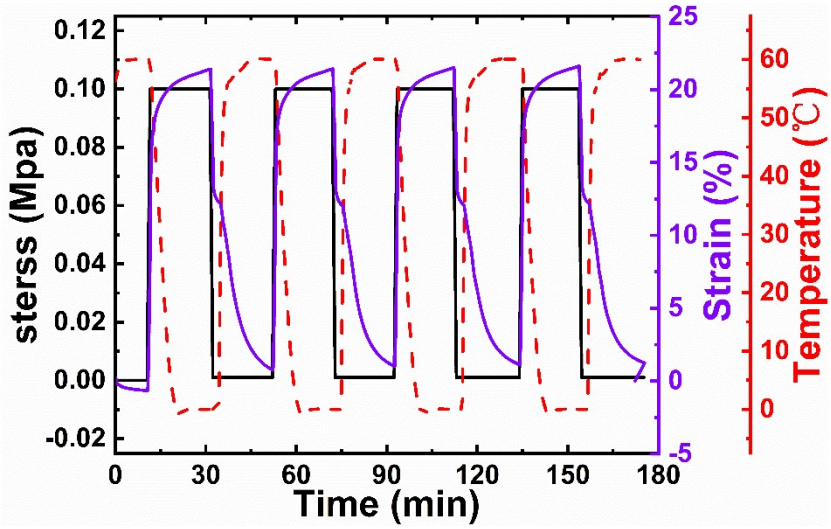

Fig. S12. Shape memory performance of PCTHA20 in the 2nd to 5th cycles (black solid line: stress; violet solid line: strain; red dashed line: temperature).

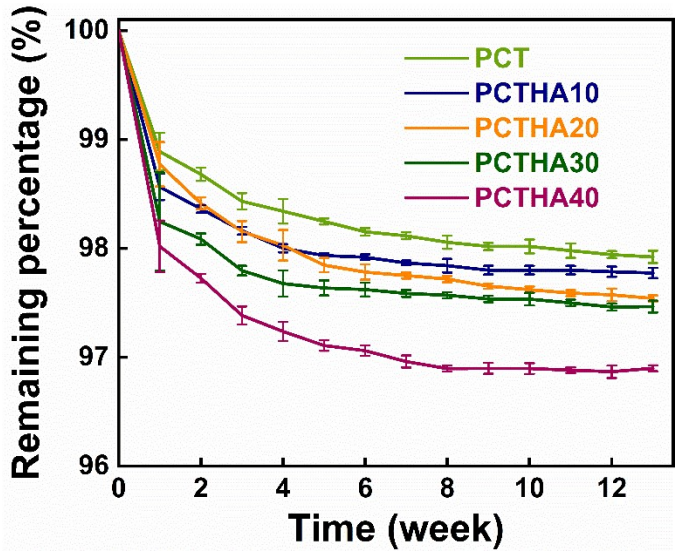

Fig. S13. The PCTHAx composite scaffold was tested for mass loss at different time intervals in PBS at 37°C.

Supporting videos

Movie S1. Compression recovery experiment of PCTHA20.

Movie S2. Bending experiments of PCTHAx with different HA content.