Supporting information

Creation of three-dimensional composite architectures via high-intensity focused ultrasound inside of foams

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Video S1. Video showing the curing of a PEGDA circle in PU foam in action.

Video S2. Thermal videos without foam (S1.1) or with foam (S1.2).

Video S3. PEGDA and HEA segments.

Video S4. A cylinder of PEGDA-PU while taking it out of the foam (double speed).

Video S5. HEA-PU after multiple compressions (triple speed).

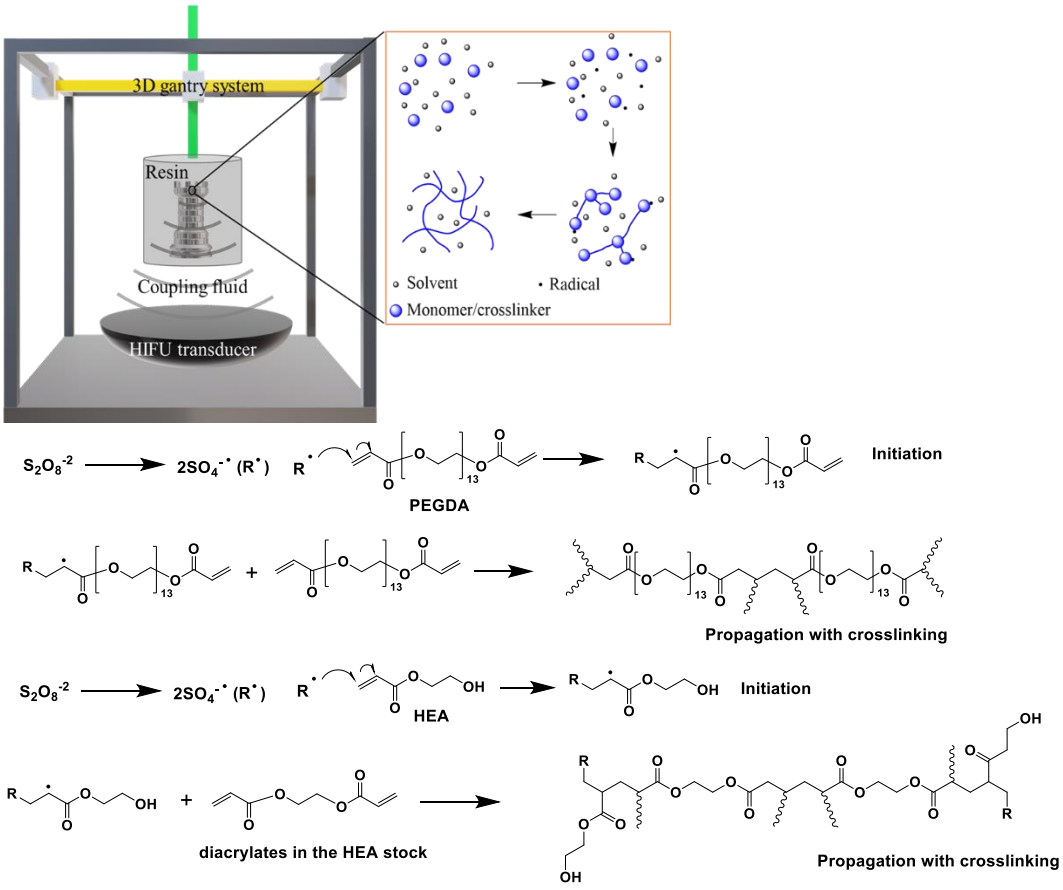

Figure S1. Idealized schematic of the HIFU process, with radical formation and propagation leading to crosslinked networks.

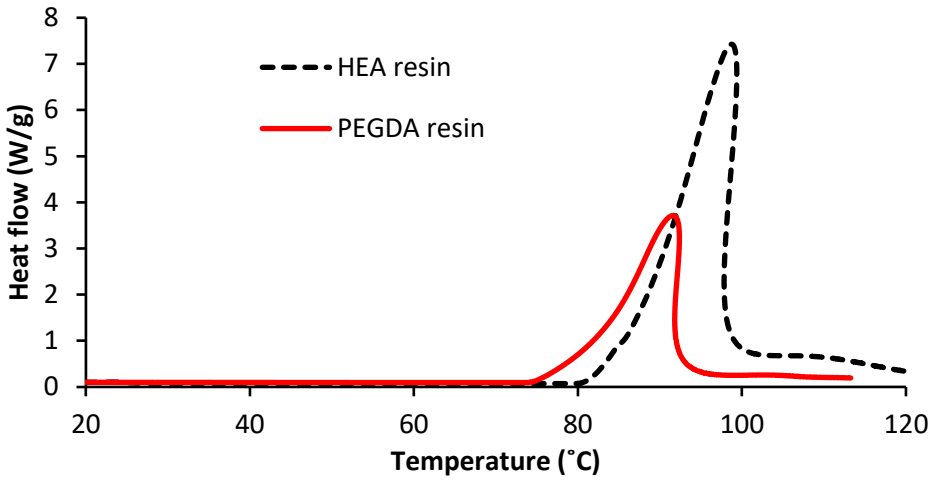

Figure S2. DSC thermogram of a PEGDA 700 or HEA resin used in this study.

Table S1. Onset temperature and enthalpy of fusion of a PEGDA 700 or HEA resin during the exothermic transition by DSC studies.

Resin	Onset temp. (˚C)	Peak temp. (˚C)	ΔH_f (J/g)[a)]
PEGDA 700	75	92	171
HEA	81	99	437

[a)]Enthalpy of fusion was calculated from weight fraction of PEGDA 700 (85 wt%) or HEA (60.6 wt%) in each resin.

For the data in Table S2 and Figure S2, the large pore foam was found to have a density of 0.046 g/cm^3 and an average pore size of 242 ± 61 µm and the small pore foam was found to have a density of 0.052 g/cm^3 and an average pore size of 177 ± 44 µm. Density was calculated from a foam cube using the mass and volume of the cube. Pore size was calculated based upon analysis of SEM images.

Table S2. Diameter of cured cylinders of PEGDA-PU at different exposure time of HIFU.[a)]

Exposure time (seconds)	Diameter of cylinders or disks (mm)	
	PEGDA in large pore foam	PEGDA in small pore foam
1	0	6.9 ± 0.4
2	6.1 ± 0.9	8.8 ± 0.8
4	11.1± 0.8	11.8 ± 0.3
6	14.7 ± 0.9	13.2 ± 0.9
8	15.9 ± 0.7	14.0 ± 0.4
10	18.6 ± 0.3	16.1 ± 1.1

a) HIFU was exposed at one focal volume. Maximum diameters of three cylinders were measured at each exposure time, and they were averaged with one standard deviation.

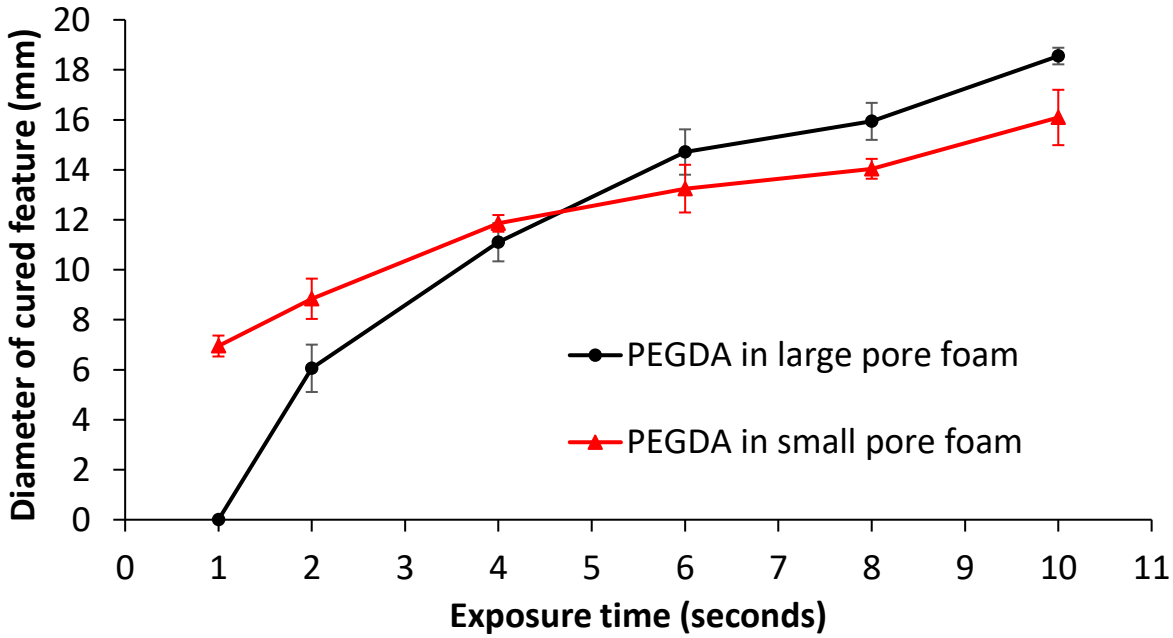

Figure S3. Diameter of cured cylinders of PEGDA-PU at different exposure times of HIFU.

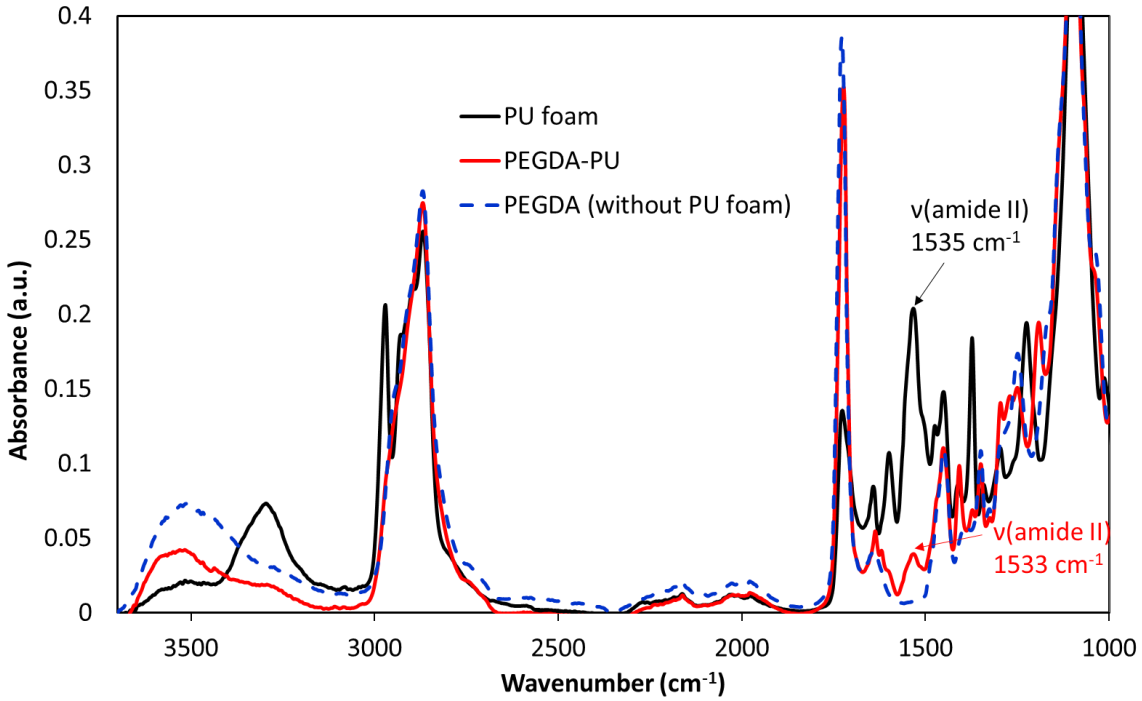

Figure S4. ATR-IR spectra of PU foam, PEGDA-PU composite prepared by HIFU and thermally cured PEGDA without PU foam.

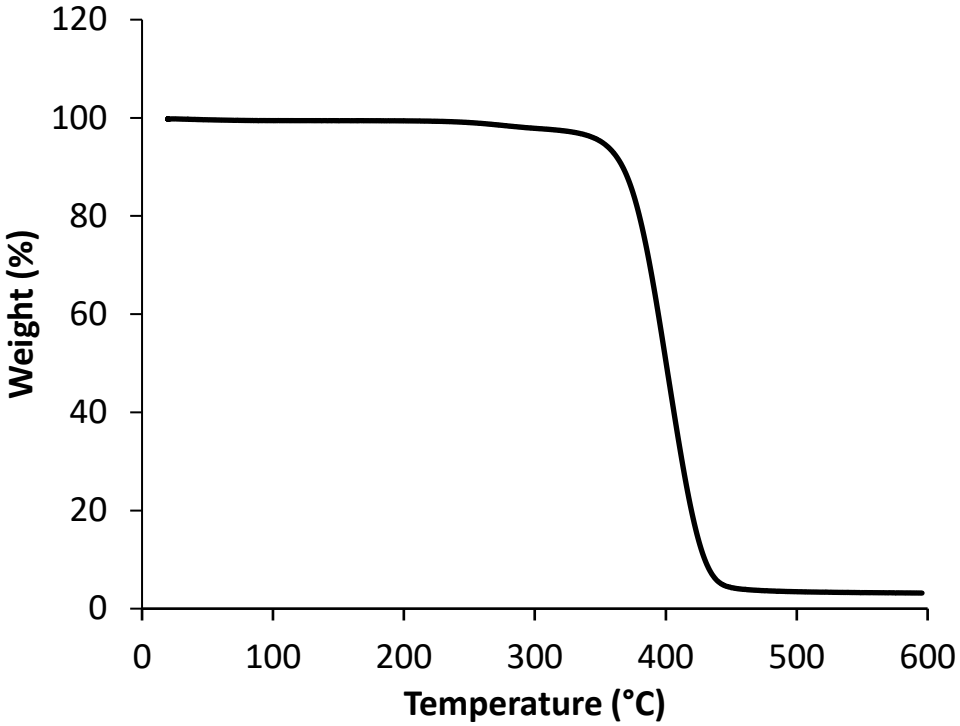

Figure S5. TGA thermogram of a PEGDA-PU composite prepared by HIFU. Decomposition temperature at 5 wt% loss, $T_{d,5wt\%}$ = 351 ˚C.

Table S3. Compressive modulus data of the PEGDA-PU composites at different weight fractions of PEGDA and HEA.

PEGDA : HEA by weight	PEGDA-HEA in PU by HIFU
100 : 0	6706 ± 961
75 : 25	1930 ± 249
50 : 50	737 ± 15
25 : 75	606 ± 69
0 : 100	70 ± 16
PU foam	13 ± 3