Fabrication of 3D objects incorporating peptides covalently attached via reversible disulfide linkages with potential for controlled drug release

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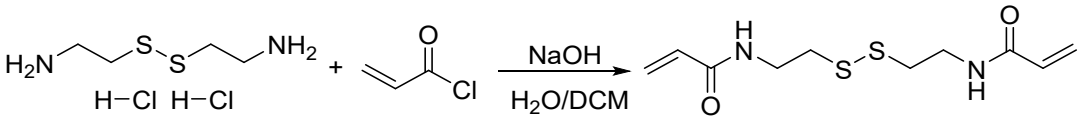
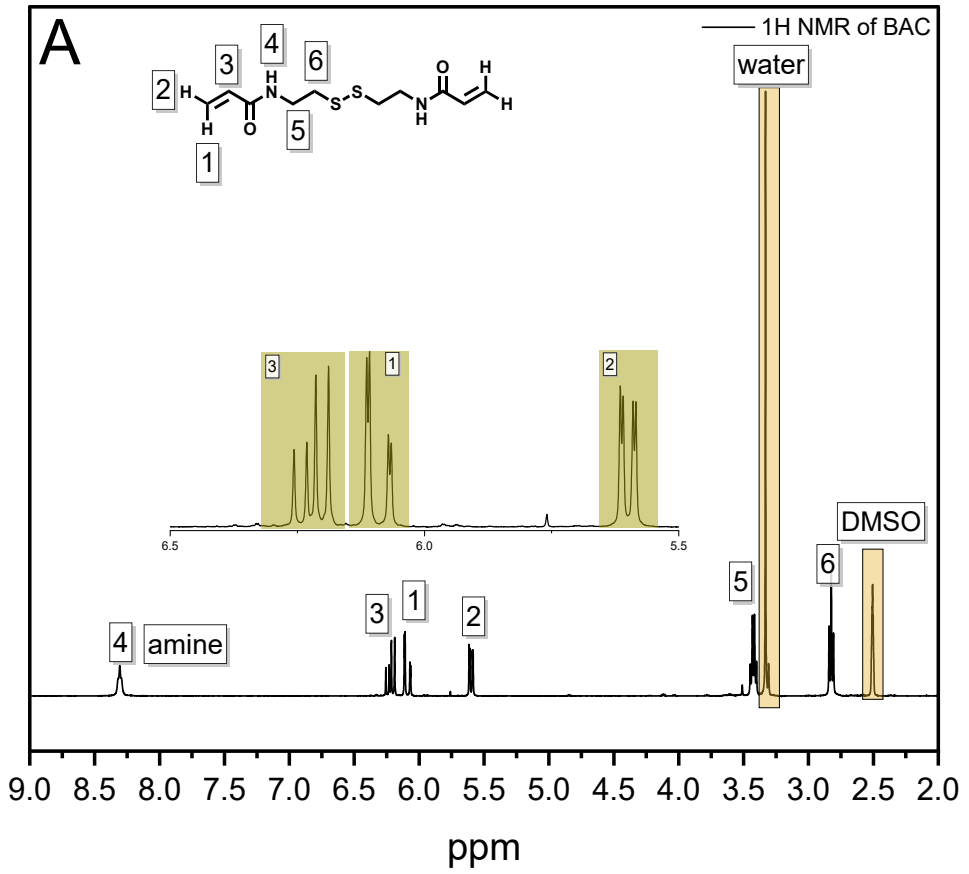
Supporting Information

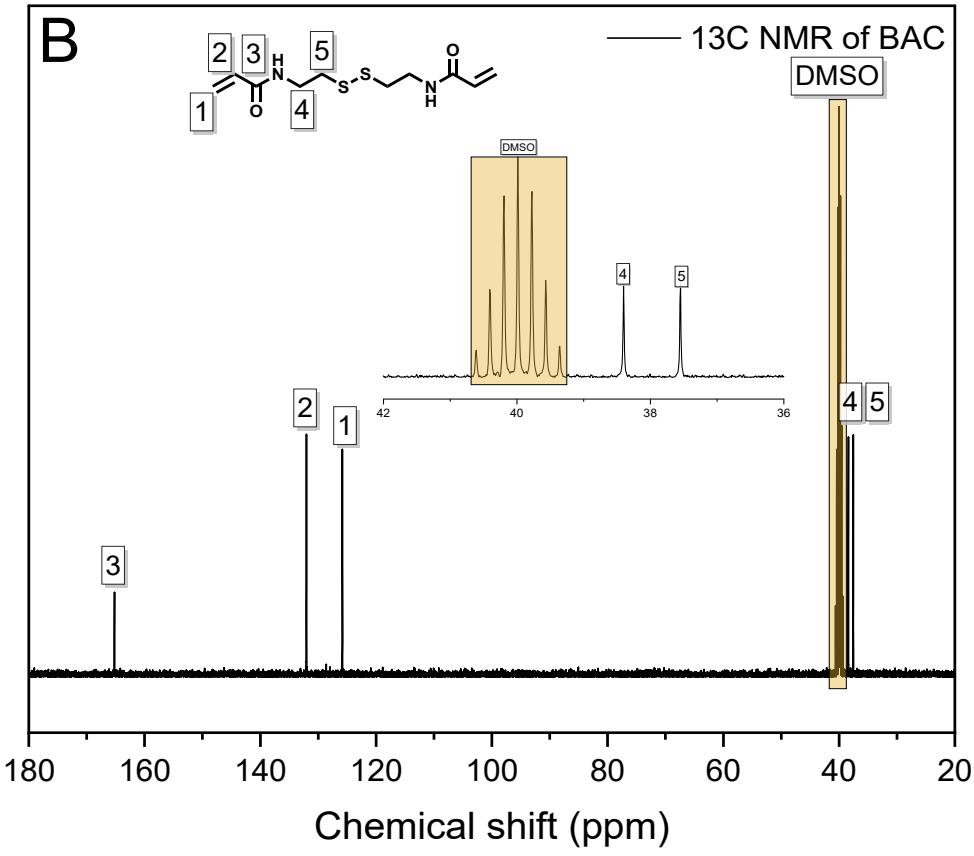
Synthesis of *N,N'*-bisacryloyl cystamine (BAC)



SI Scheme 1. Synthesis of the bisacrylamide disulphide containing crosslinking agent (BAC)

11.26 g (0.05 mol) cystamine dichlorohydrate was dissolved in 100 ml deionized H_2O. 20 ml of a 10 M sodium hydroxide solution was added, and the mixture cooled to 0 ℃ in an ice bath and subsequently a solution of 9.05 g (0.1 mol) acryloyl chloride in 10 ml dichloromethane was added over 15 minutes. The ice bath was removed, and the reaction allowed to continue for approximately 2 hours at ambient temperature. The crude *N,N'*-bisacryloyl cystamine (BAC) precipitated from the reaction medium and subsequently the crude BAC isolated by suction filtration and washed with 50 ml deionized H_2O 3 times prior to being recrystallized from ethyl acetate. Yield = 10.12g (50.5%).

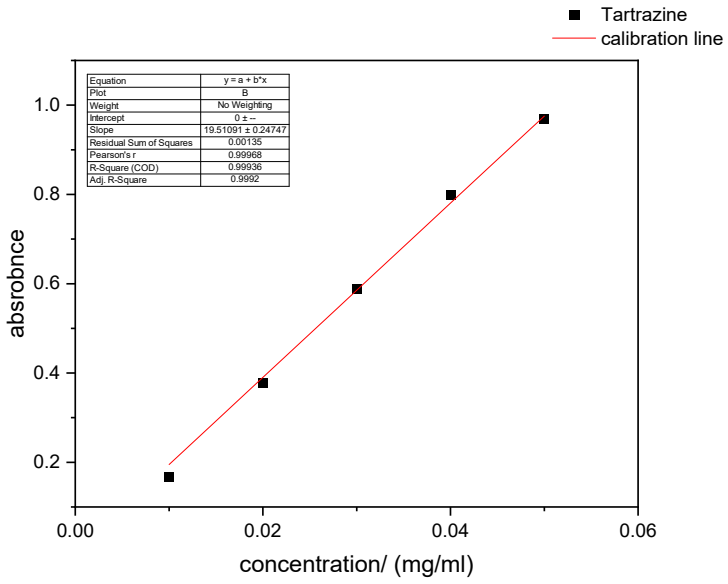

A
1H NMR of BAC
water
DMSO
amine
ppm


B
13C NMR of BAC
DMSO
Chemical shift (ppm)

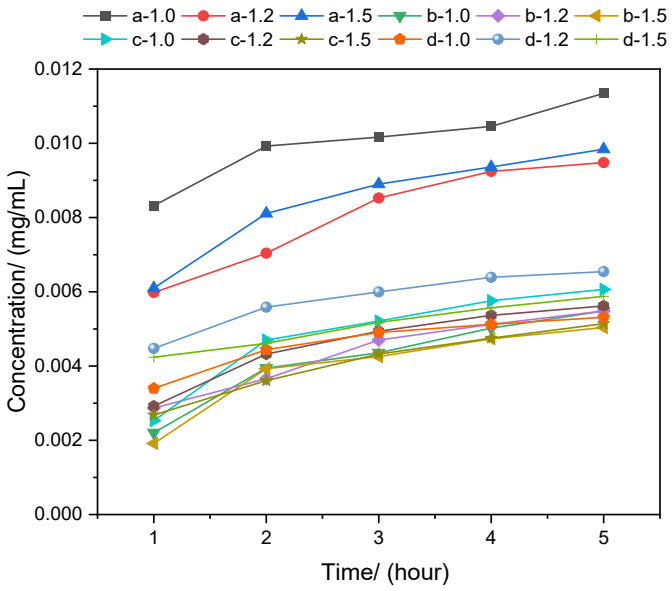
SI. 1 (A) ^{1}H and (B) ^{13}C NMR (400 MHz, DMSO) spectrum of BAC.

^{1}H NMR (400 MHz, DMSO) δ = 2.82 (Triplet, J = 6.72 Hz, 4H, CCH_2S); 3.42 (Quartet, J = 6.36 Hz, 4H, NCH_2C); 5.58, 5.61 (Doublet, J = 2.20 Hz, 2H, $C=CH_2$); 6.07, 6.11 (Doublet, J = 2.20 Hz, 2H, $C=CH_2$); 6.19, 6.23 (Doublet, J = 10.03 Hz, H, HC=O); 8.31 (singlet, 2H, CNHC).

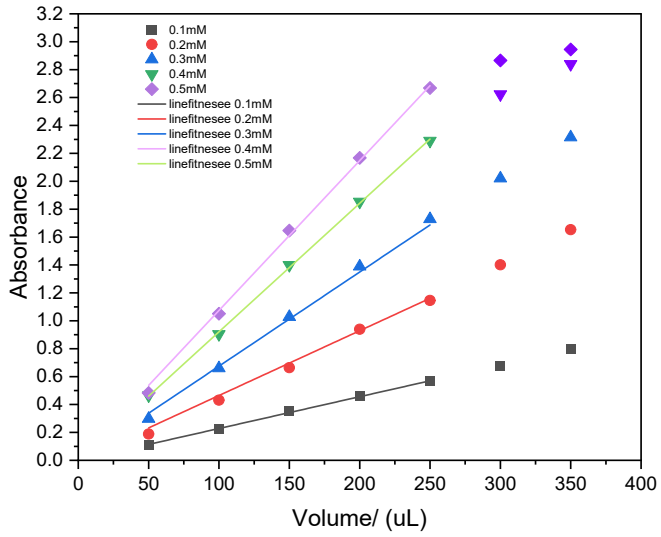
^{13}C NMR (400 MHz, DMSO) δ = 37.55 (-C-S-), 38.40 (-NH-C-), 125.82 ($\underline{CH_2}$=CH), 132.03 (CH_2=$\underline{C}$H), 165.2 (NH-C=O).



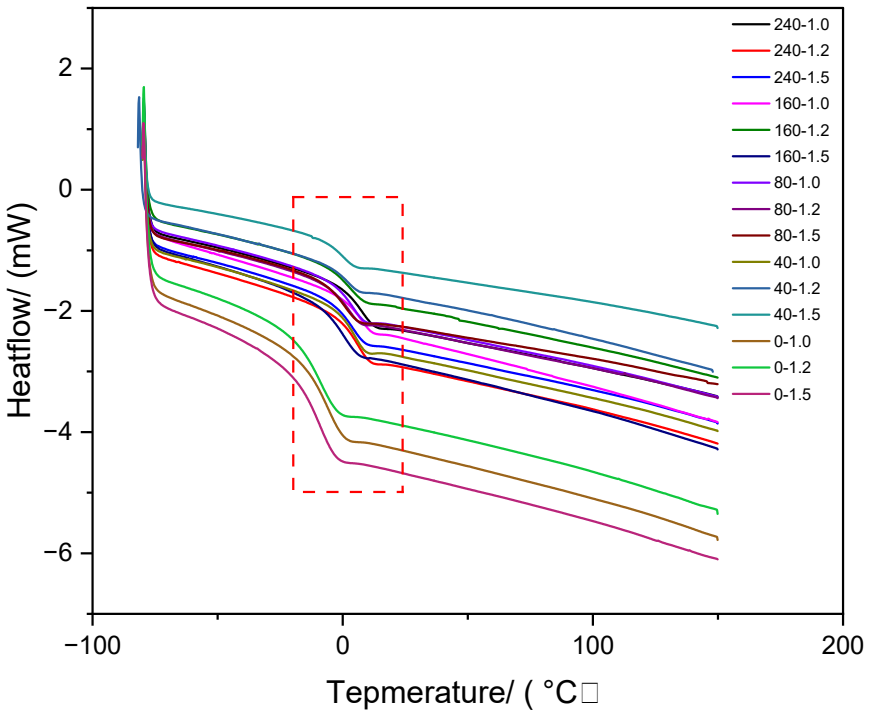
SI. 2 Calibration line for tartrazine concentration.



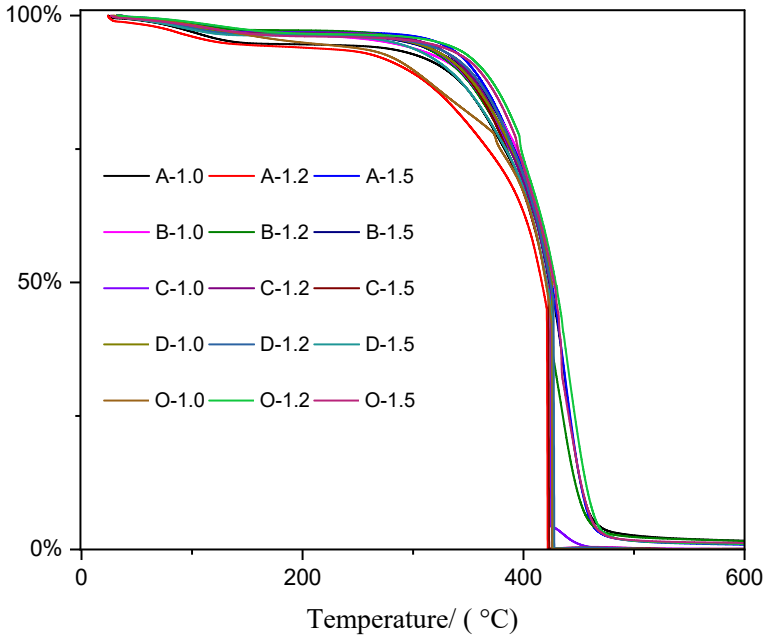
SI. 3 Concentration of tartrazine washing with DI water measured by UV-Vis over 5 hours.



SI. 4 Calibration line of different concentration (0.1/0.2/0.3/0.4/0.5 mM) peptide in different volumes (50/100/150/200/250 uL).

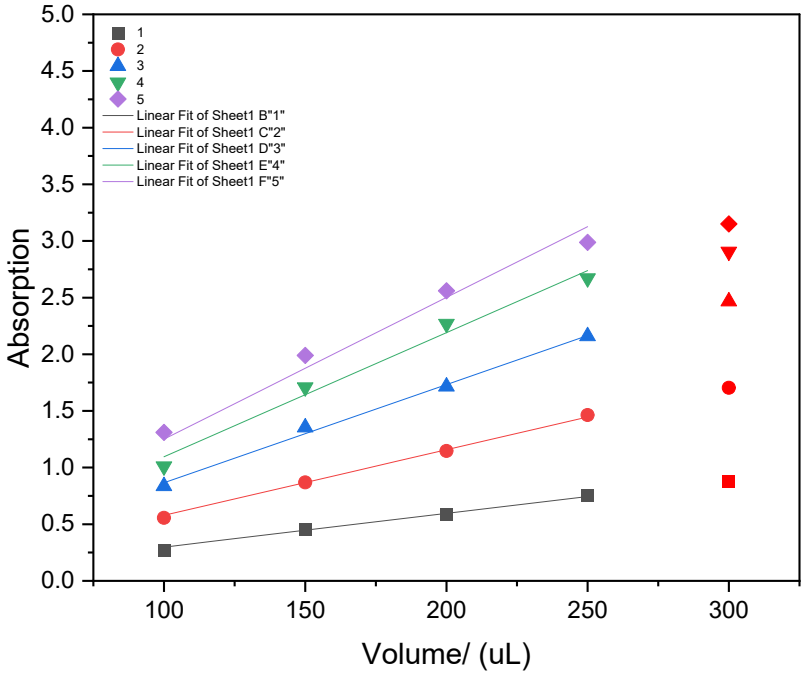


SI. 5 DSC traces of all formulations.



SI. 6 TGA of series 1,2,3,4, and blank series hydrogel.

	Bottom layer	Normal layer
Layer thickness/ (um)	100	100
Exposure time/ (s)	10	7
Light intensity/ (mW/cm^2)	15.6	15.6



SI. 7 Calibration line of different concentration (1/2/3/4/5 mM) peptide in different volumes (50/100/150/200/250 uL) at λ = 298 nm.

SI Table 1. The calibration of (1/2/3/4/5 mM) lanreotide at λ = 298nm.

Concentration/ (mM)	Equation	R-square
1	Y=0.00298x	0.999
2	Y=0.00579x	0.999
3	Y=0.00866x	0.999
4	Y=0.01095x	0.999

5	Y=0.0125x	0.999

SI Table 2. The T_g of formulation (series A/B/C/D/O)

Formulation	A	B	C	D	O
1	7.74	6.13	4.29	2.96	-5.17
2	5.82	3.34	1.74	0.02	-8.56
3	4.12	0.52	-1.28	-1.64	-9.57