1. AlgMA synthesis

The degree of methacrylation, or substitution, can be determined by calculating the ratio of the regions assigned to sodium alginate (2.5-4.5 ppm) and methacrylhydrin (1.0-2.5 ppm, 5.5-6.6 ppm) and converting it to a value representing the degree of substitution relative to 100% substitution (methacrylation). When we say that there is 100% substitution, it means that every sugar unit in the sodium alginate chain has a methacryl group attached to it[1]. Briefly, 100% DM = 5 methacryl H : 5 sodium alginate H = 1 In Fig. s2, the integration ratio = (1.00 + 1.11 + 4.2) : 20.20 = 0.31 Thus, DM = 0.31/1 × 100% = 31%.

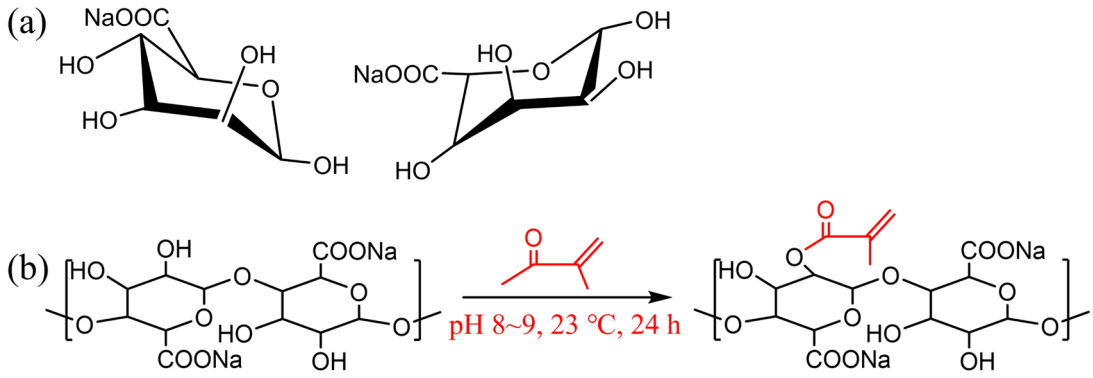

Figure S1 (a) Mannuronic acid (M sequence) on the left and glucuronic acid (G sequence) on the right. (b) Schematic diagram of AlgMA synthesis.

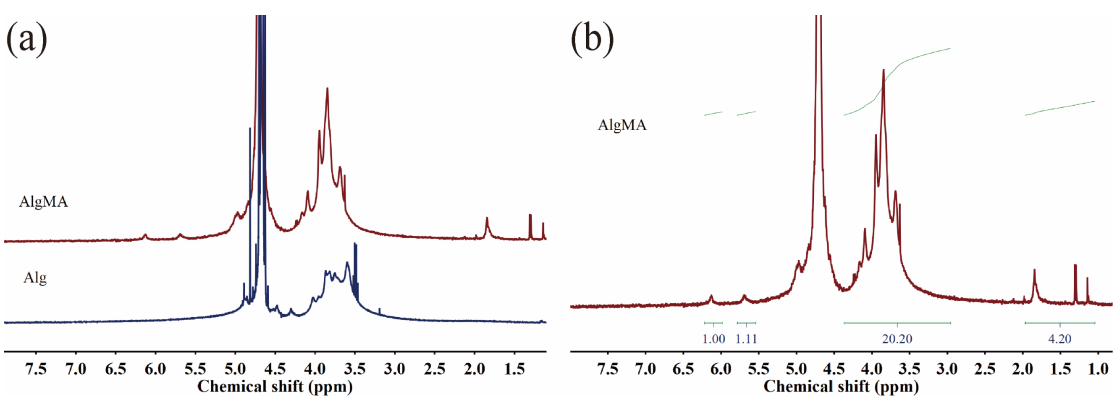

Figure S2 (a) ^{1}H NMR spectra of AlgMA and Alg in D_2O; (b) area analysis of AlgMA hydrogen spectrum.

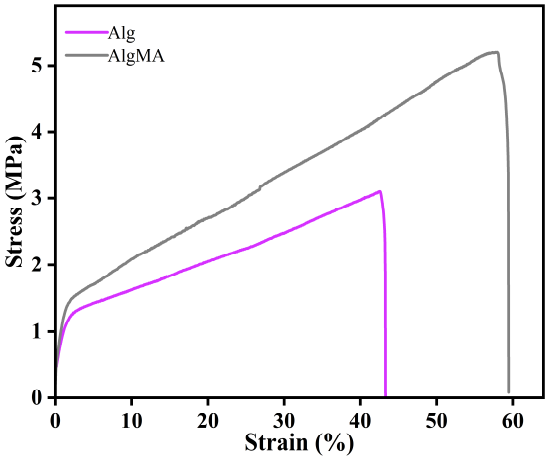

Figure S3 Tensile stress-strain analysis of Alg-modified.

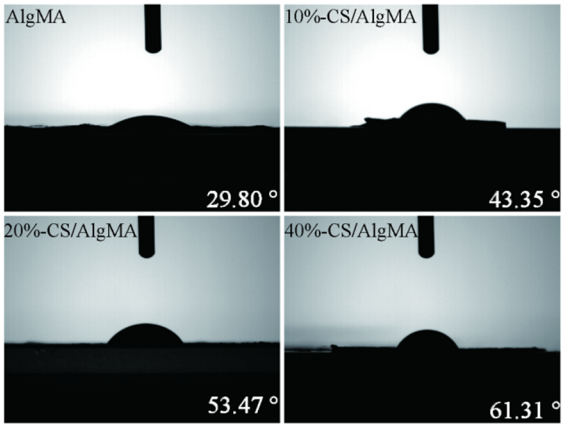

Figure S4 Hydrophilic property test results of CS/AlgMA

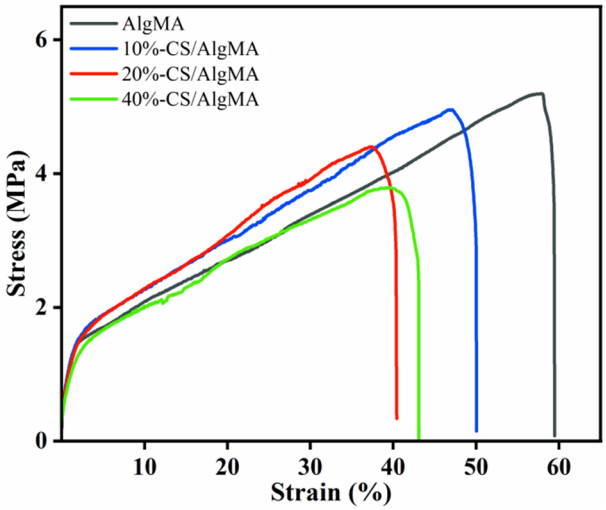

Figure S5 Tensile stress-strain curve of CS/AlgMA.

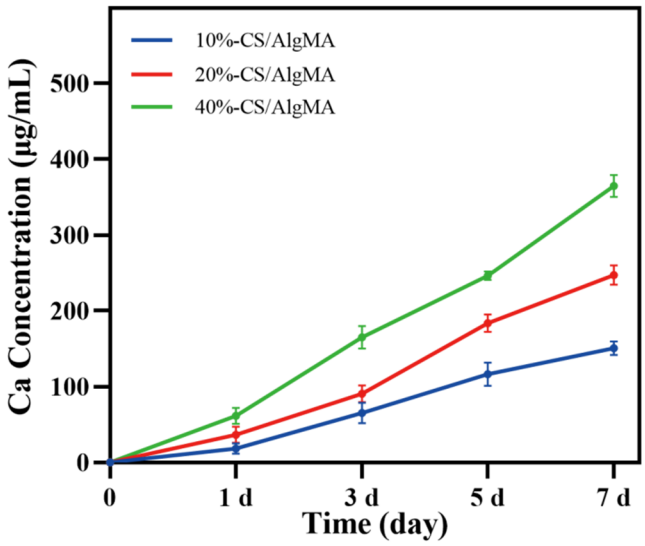

Figure S6 Ca^{2+} release profile.

Table S1 Quantitative migration rate of HUVECs for 48 h (n=5)

Group	Migration Rate (%)
Control	57.86 ± 7.82
10% CS	79.11 ± 1.22**
20% CS	82.83 ± 1.73
40% CS	70.36 ± 1.88**

**p<0.01 vs Control

Table S2 Quantitative collagen deposition by Masson's Trichrome

Group	Day 7 Collagen	Day 14 Collagen	Microstructure
Control	8.92±2.11%	18.37±3.05%	Disorganized fibers
AlgMA	14.33±3.72%*	22.84±2.17%*	Mixed maturity
20%-CS/AlgMA	**20.46±5.53%***	27.19±4.38%*	Aligned collagen bundle

*p<0.05 vs Control; p<0.05 vs AlgMA

[1] V. Kapishon, R.A. Whitney, P. Champagne, M.F. Cunningham, R.J. Neufeld, Polymerization Induced Self-Assembly of Alginate Based Amphiphilic Graft Copolymers Synthesized by Single Electron Transfer Living Radical Polymerization, Biomacromolecules. 16(2015) 7, 2040-2048, https://doi.org/10.1021/acs.biomac.5b00470