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SUPPORTING INFORMATION Triggered Release of Bacteriophage K from Agarose/Hyaluronan Hydrogel Matrices by *Staphylococcus aureus* Virulence Factors

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Figure S1, FTIR spectra of hyaluronic acid and hyaluronic acid methacrylate (HAMA), with appearance of peak at 1455 cm⁻¹ giving evidence of methacrylation

Figure S2 ^1H NMR spectrum of Hyaluronic Acid Methacrylate (HAMA). Resonances at 5.6 and 6.2 ppm verified the presence of methylene protons.

Figure S3 Carbazole assay reaction mechanism

	<u>Swelling ratio, Q_M</u>	<u>Volumetric Swelling Ratio, Q_V</u>	<u>Florey Parameter, χ</u>	<u>Specific volume of dry polymer, $v(\text{cm}^3/\text{g})$</u>	<u>Average molecular weight between XL, $M_c(\text{g/mol})$</u>	<u>Effective Crosslink Density, $V_e(\text{mol}/\text{cm}^3)$</u>	<u>Mesh Size, $\xi(\text{nm})$</u>
0%PEGDA	68.4±3.9	83.8	0.473	0.575	7.45E+07	1.65E-08	6604
1%PEGDA	42.5±0.7	52.0	0.473	0.575	2.26E+07	5.45E-08	3099
5%PEGDA	15.6±0.1	19.0	0.473	0.575	1.81E+06	6.78E-07	627
10%PEGDA	8.7±0.3	10.5	0.473	0.575	4.13E+05	2.98E-06	246

Figure S4 Swelling ratio Q_M of HAMA-co-PEG hydrogels

Figure S5 Quantitative analysis of HAase breakdown of 2% HAMA /1% PEGDA gels, measured via the release of NAG (measured using the Carbazole assay) as a function of incubation time and concentration of hyaluronidase.

Figure S6 Phage K in agarose – killing of *S. aureus* H560: Complete suppression of growth / killing seen at all agarose concentrations.

Figure S7 Bacteriophage K lysis of *S. aureus* H560 bacterial lawns on agar in 0.2%, 0.4% and 0.7% agarose

Figure S8 Screen of 116 *Staphylococcus* sp. and strains for HAase activity. Concentrations of NAG > 0.4 mM are considered very high, under 0.01 mM low and between these values intermediate, but sufficient to trigger phage release.

Figure S9 SEM images of HAMA hydrogels after 2h incubation with *S. aureus* supernatant. HAase positive strains: a) RN6390B, b) H560, c) lac. HAase negative strains: d) hys-, e) Mμ2, and f) TSB growth medium.