

Supporting Information

GPC and solubility of VP-PEGMA copolymers. The complete results of gel permeation chromatography (GPC) analysis for the copolymers of vinylpyridine (VP) and the different molecular weights of poly(ethylene glycol) methyl ether methacrylate (PEGMA) of different molecular weights are displayed in Table S1, as described in the regular text. The solubility of the various copolymers in water is shown in Table S2. Copolymers of VP and PEGMA that were not soluble in water were soluble in chloroform.

Table S1. Results of GPC testing performed on VP-PEGMA *n* copolymers to determine average molecular weight (M_n), and polydispersity index (PDI).

mol% VP	P(VP-co-PPEGMA 300)		P(VP-co-PPEGMA 475)		P(VP-co-PPEGMA 1100)	
	M_n	PDI	M_n	PDI	M_n	PDI
10	23,000	1.89	25,000	1.40	13,000	1.38
25	22,000	1.85	21,000	1.90	16,000	1.20
50	19,000	2.66	21,000	2.00	17,000	1.34
75	10,000	1.51	19,000	1.92	17,000	1.55
90	N/A	N/A	N/A	N/A	8,000	1.72

Table S2. Complete table of the solubility of VP-PEGMA *n* copolymers in water.

mol% VP	P(VP-co-PPEGMA 300)	P(VP-co-PPEGMA 475)	P(VP-co-PPEGMA 1100)
10	Soluble	Soluble	Soluble
25	Soluble	Soluble	Soluble
50	Soluble	Soluble	Soluble
75	Soluble	Soluble	Soluble
90	Insoluble	Insoluble	Soluble

Validation of bactericidal results with common biocides. Ideally, metrics such as the minimum bactericidal concentration (MBC) are invariant to testing method; however, in practice, MBC measurements are a reflection of the testing method and environmental conditions. For this reason the common biocides poly(hexamethylene

biguanide) (PHMB) and Triclosan were tested to validate our methodology. Figures S1 and S2 show the full results of our experiments with these common biocides.

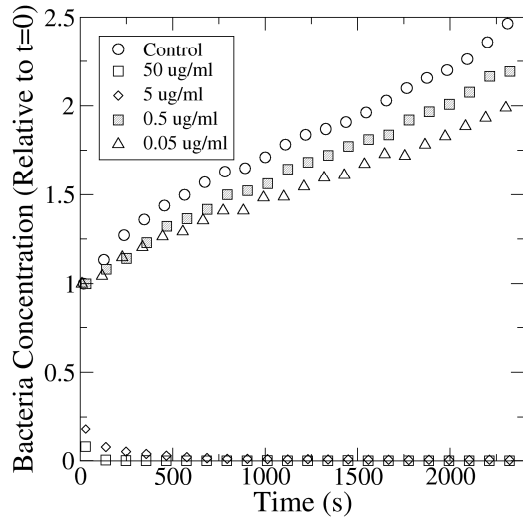


Figure S1. Bacteria luminescence results for PHMB at varying concentrations. The legend displays the polymer concentration in units of $\mu\text{g/ml}$.

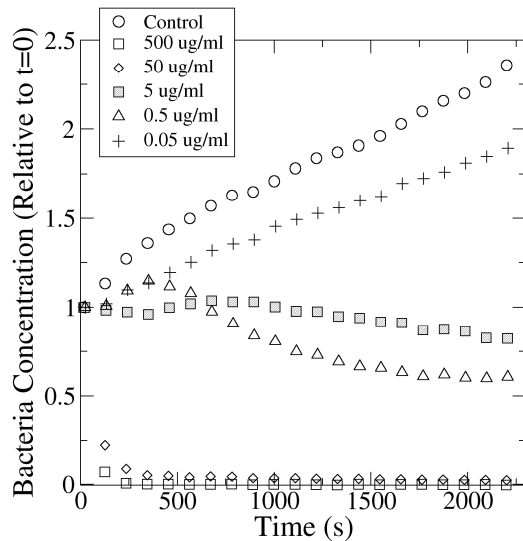


Figure S2. Bacteria luminescence results for Triclosan at varying concentrations. The legend displays the polymer concentration in units of $\mu\text{g/ml}$.

Equation fitting constant values for control samples. Table S3 displays the values of a , b , and c from Eq. 5 found when fitting the control samples for each

experiment. The values of a, b, and c are different for each experimental set, as small changes in the bacteria concentration or environment can change the shape of the control curve, and with three fitting variables, these values can vary widely. The values for PHMB and Triclosan and identical as both samples were tested in the same experimental run.

Table S3. The values of the constants a, b, and c as per the nonlinear optimization of the simplified Monod's Equation shown in Eq. 5 for the control sample of each experimental run.

Material	a	b	c
P(VP-co-PEGMA 1100)-HB 50/50	57.4926	3.05073	$2.09 \cdot 10^5$
P(VP-co-PEGMA 1100)-HB 90/10	16,489.9	2.89382	$9.05 \cdot 10^7$
P(VP-co-HEMA)-HB 50/50	$1.073 \cdot 10^{-3}$	3.27494	7.86008
P(VP-co-HEMA)-HB 90/10	$7.45 \cdot 10^{-3}$	$7.63 \cdot 10^6$	$3.66 \cdot 10^8$
PHMB, Triclosan	357,497	2.61537	$8.23 \cdot 10^8$
PVP-HB	40,468	3.27269	$1.86 \cdot 10^8$

Relationship between polymer concentration and killing coefficient. In our results we have found that the quantity $C_{\text{poly}} \cdot k_{\text{kill}}$ is often but not necessarily linear in k_{kill} . The concentration of polymer C_{poly} decreases much faster than the quantity $C_{\text{poly}} \cdot k_{\text{kill}}$, causing k_{kill} to increase at lower polymer concentrations, as shown in Figure S3. The concentration of polymer C_{poly} decreases much faster than the quantity $C_{\text{poly}} \cdot k_{\text{kill}}$, causing k_{kill} to increase at lower concentrations (see Tables 1a, 1b and 2), although for some polymers an inflection point is reached where a small increase in polymer concentration causes the material to become highly bactericidal, as seen in Figures 3 and S1, causing a sudden decrease in the value of k_{kill} at higher polymer concentrations, as seen in Figure S3. However, outside of these abrupt shifts in efficacy, the linear relationship of C_{poly}^{-1} and k_{kill} persists.

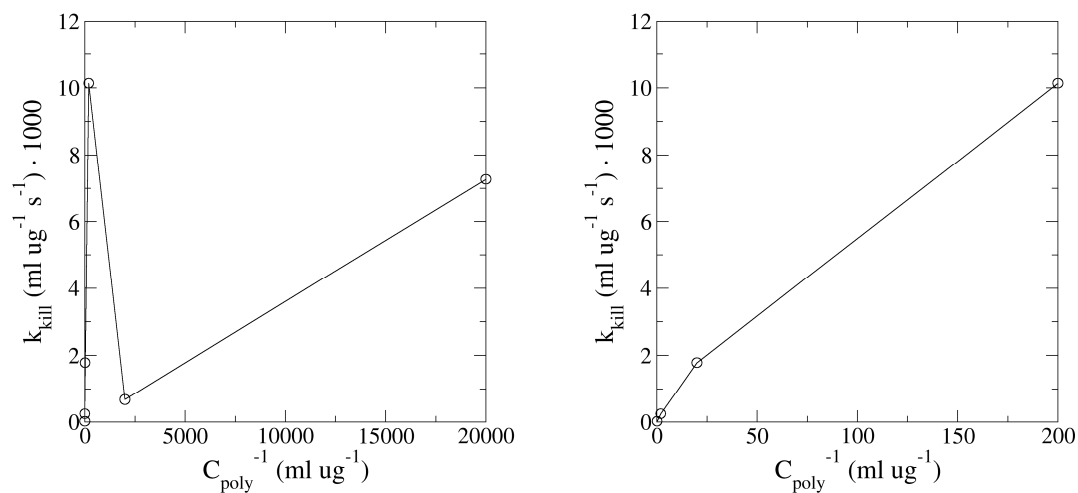


Figure S3. C_{poly}^{-1} vs. k_{kill} for PHMB. Left plot shows the entire range of results; right plot displays an inset of the results at lesser values of C_{poly}^{-1} . These results are representative; other samples showed similar features.