Electronic Supporting Information

Stimuli-responsive microgels with cationic moieties: Characterization and interaction with *E.coli* cells

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Zetapotential (ζ) of charged poly(VCL-VIM$^+$) microgels calculated from electrophoretic light scattering (ELS)

Table S1 Zetapotential (ζ) and electrophoretic mobility (μ_E) of poly(VCL-VIM$^+$) microgels with 3-10 mol% VIM$^+$ content measured by electrophoretic light scattering at T = 20 °C and 60 °C in H_2O.

VIM$^+$ concentration [mol%]	μ_E at 20 °C [µmcm/Vs]	μ_E at 60 °C [µmcm/Vs]	ζ potential at 20 °C [mV]	ζ potential at 60 °C [mV]
3	1.24 ± 0.15	5.25 ± 0.15	17.5 ± 2.1	41.7 ± 1.2
5	1.75 ± 0.02	5.62 ± 0.12	24.6 ± 0.2	44.6 ± 0.9
10	2.71 ± 0.17	5.74 ± 0.15	38.2 ± 2.4	45.6 ± 1.2

Raman spectra of PVCL and poly(VCL-VIM$^+$) microgels with 3, 5, and 10 mol% VIM$^+$

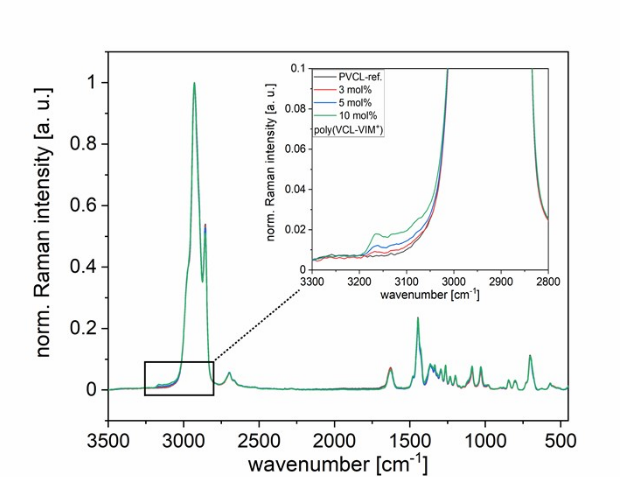


Fig. S1 Raman spectra of PVCL (reference) and poly(VCL-VIM$^+$) microgels with 3, 5, and 10 mol% VIM$^+$. For all the samples the crosslinking density is 2 mol% BIS. The region characteristic for stretching vibration (C-H) at ν = 3160 cm^{-1} is enlarged and shown in insert.

Self-diffusion coefficients as a function of temperature of charged microgels determined by dynamic light scattering (DLS)

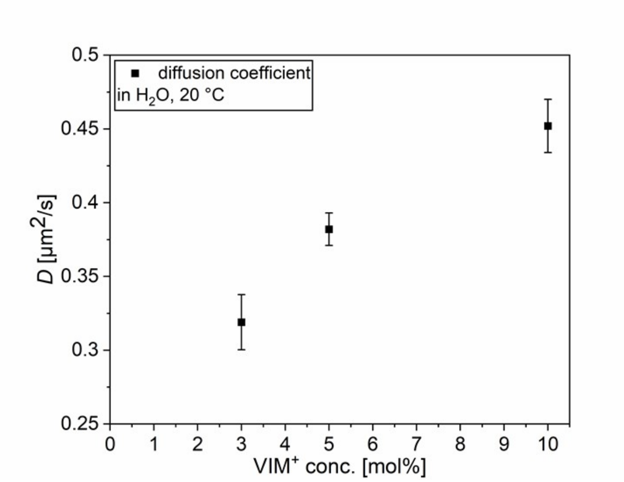
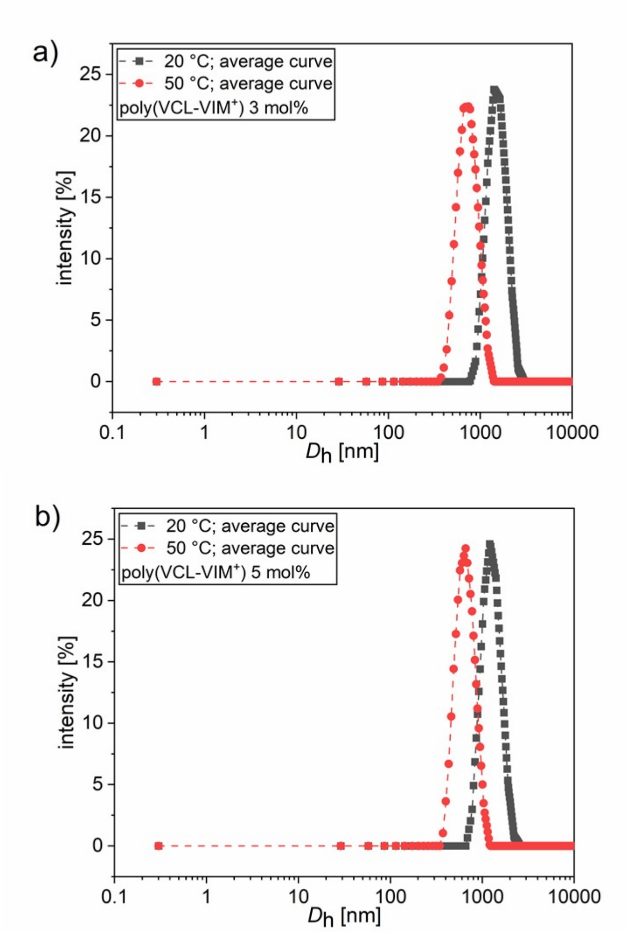


Fig. S2 Self-diffusion coefficients (D) of PVCL and poly(VCL-VIM$^+$) microgels measured at $T = 20$ °C by DLS as a function of VIM$^+$ comonomer concentration.

Laplace transformation of electrical field autocorrelation functions for microgels



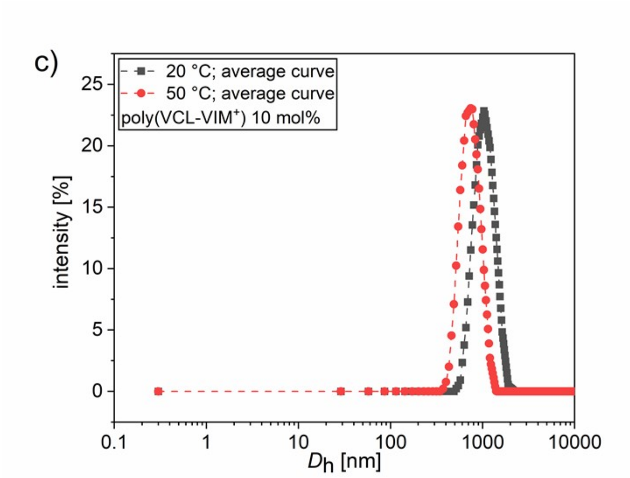


Fig. S3 Laplace transformation of electrical field autocorrelation functions for 3, 5, and 10 mol% VIM^+ comonomer. Average plots from three measurements are shown for the swollen state (T = 20 °C), as well as the collapsed state (T = 50 °C) of the respective microgel.

Volume phase transition by ^{1}H NMR spectroscopy and relaxometry described by sigmoidal Boltzmann function.

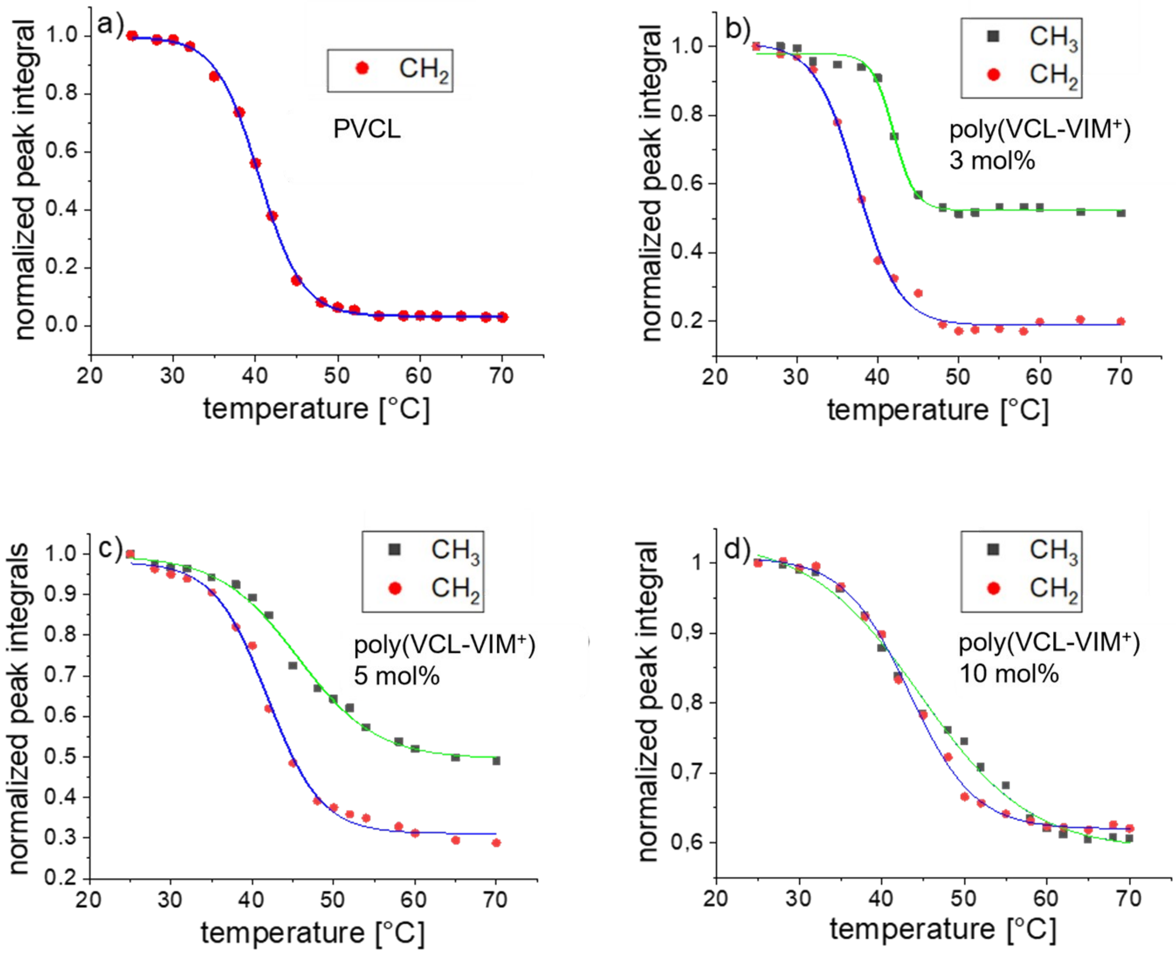


Fig. S4 Volume phase transition for PVCL (a), poly(VCL-VIM$^+$) with 3 mol% VIM$^+$ (b), 5 mol% VIM$^+$ (c) and 10 mol% VIM$^+$ (d). The sigmoidal Boltzmann function was used for fits of the curves for CH_3 (VIM$^+$, green line) and CH_2 (VCL, blue line). The fit parameters T_t and ΔT_t are given in Table S2.

Table S2 Volume phase transition temperature T_t, and ΔT_t for PVCL and poly(VCL-VIM$^+$) microgels with different concentration in methylated vinylimidazole (VIM$^+$). Thermodynamic parameters T_t, and ΔT_t were obtained from sigmoidal Boltzmann fit functions for CH_3 and CH_2 ^1H NMR resonances shown in temperature dependent volume phase transition of Fig. S2.

microgel	T_t [°C][a]	ΔT_t [°C][a]
p(VCL)	40.4	2.6
poly(VCL-VIM$^+$)-3 mol%		
CH_3	41.9	1.3
CH_2	37.4	2.6
poly(VCL-VIM$^+$)-5 mol%		
CH_3	45.6	4.8
CH_2	41.9	3.3
poly(VCL-VIM$^+$)-10 mol%		
CH_3	44.6	6.7
CH_2	43.3	3.9

[a]Errors are of the order of 5 %.

Interaction of poly(VCL-VIM) microgels with *E.coli* cells

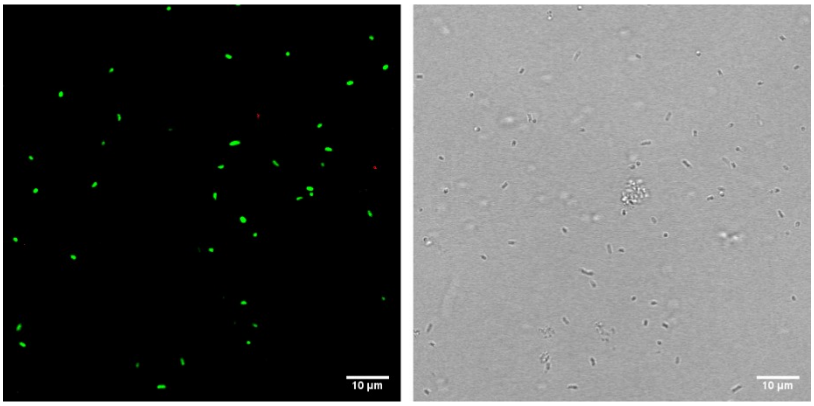


Fig. S5 CLSM images of poly(VCL-VIM) microgels containing 10 mol% unmodified vinylimidazole exposed to cells after LIVE/DEAD staining of *E.coli cells* by using ab189818 bacterial viability assay kit from abcam®. In the merged darkfield image (left) alive cells are shown in green, dead cells are presented in red and the corresponding brightfield images are shown on the right-hand side.

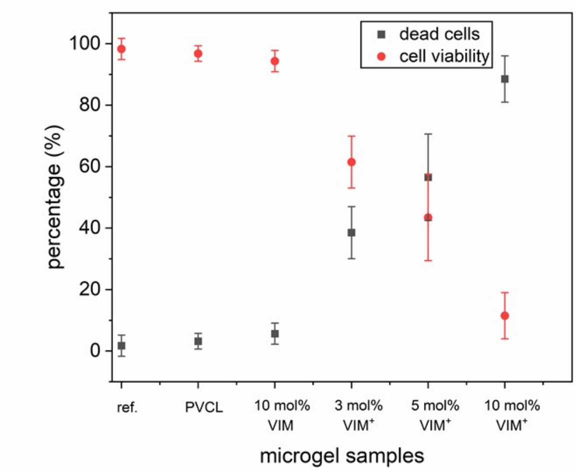


Fig. S6 Percentage of dead cells (black) and cell viability (red) of free cells (ref.) and cells exposed to PVCL microgels, poly(PVCL-VIM) microgels containing 10 mol% unmodified comonomer vinylimidazole as well as poly(VCL-VIM^{+}) microgels with increasing comonomer content (3-5mol%).