

Supporting Information

Ion specificity influences on the structure of zwitterionic brushes

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The index of refraction can be expressed in the term of dispersion $\delta(\mathbf{r})$ and absorption $\beta(\mathbf{r})$:

$$n(\mathbf{r}) = 1 - \delta(\mathbf{r}) + i\beta(\mathbf{r});$$

which can be simplified as:

$$n = 1 - \frac{\lambda^2}{2\pi} r_e \rho + i \frac{\lambda}{4\pi} \mu$$

where, r_e is the classical electron radius, ρ is the electron density, μ is the linear absorption coefficient, $r_e \rho$ is the SLD, and λ is the X-ray wavelength. The dispersion term $\delta(\mathbf{r})$ of the aqueous solutions are listed below:

Table S1. Dispersion values used for aqueous solutions

Aqueous solution	Concentration / M	Dispersion term $\delta(\mathbf{r})$
Water	-	5.2136e-07
NaSCN	0.1	5.2075e-07
	0.3	5.1984e-07
	1	5.1935e-07
	3	5.1791e-07
NaNO ₃	0.1	5.2072e-07
	0.3	5.1977e-07
	1	5.1914e-07
	3	5.1740e-07
NaBr	0.1	5.2018e-07
	0.3	5.1818e-07
	1	5.1420e-07
NaCl	0.1	5.2080e-07

	0.3	5.2000e-07
	1	5.1979e-07
	3	5.1869e-07
Na ₂ SO ₄	0.1	5.2040e-07
	0.3	5.1882e-07
	1	5.1631e-07

Table S2. pH values of the aqueous solution used in this study

	Highest Concentration Used (M)	pH
Milli-Q water		5.88
NaSCN	3.0	7.61
NaNO₃	3.0	5.28
NaBr	3.0	6.14
NaCl	3.0	5.92
Na₂SO₄	1.0	5.32
Ba(NO₃)₂	0.3	5.27
Ca(NO₃)₂	1.0	5.52
Y(NO₃)₃	1.0	4.96

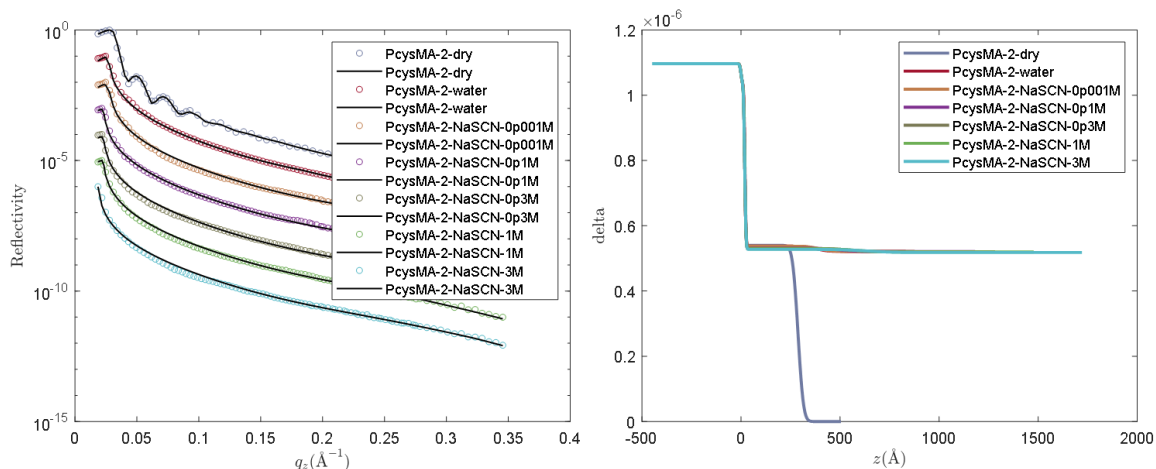


Figure S1. XRR spectra (open circles) and fitting (solid line) of dry and PCysMA brushes in the presence of water and 1 mM, 0.1 M, 0.3 M, 1 M, and 3M NaSCN solutions (left), and corresponding scattering length densities (SLDs) of the PCysMA brush obtained from the best fittings of the XRR data presented (right).

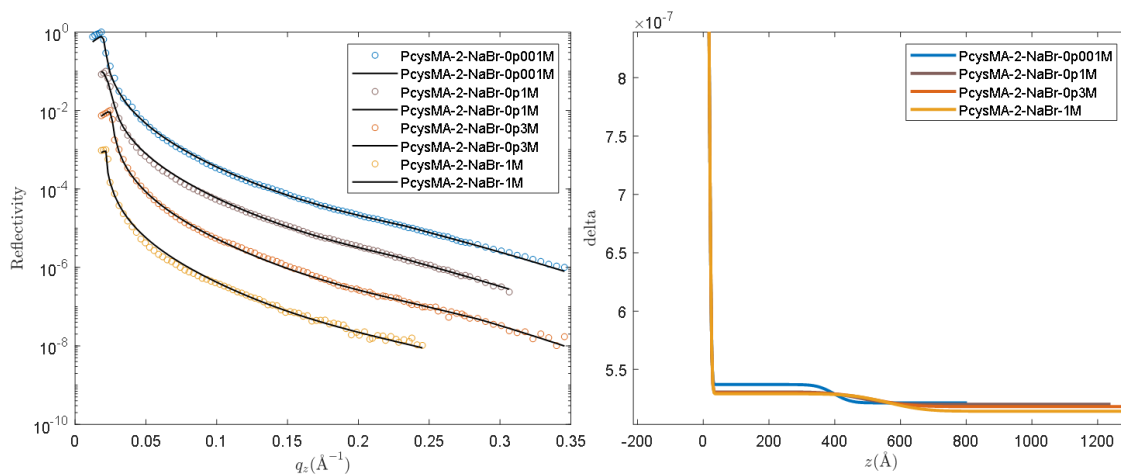


Figure S2. XRR spectra (open circles) and fitting (solid line) of PCysMA brushes in the presence of 1 mM, 0.1 M, 0.3 M, and 1 M NaBr solutions (left), and corresponding scattering length densities (SLDs) of the PCysMA brush obtained from the best fittings of the XRR data presented (right).

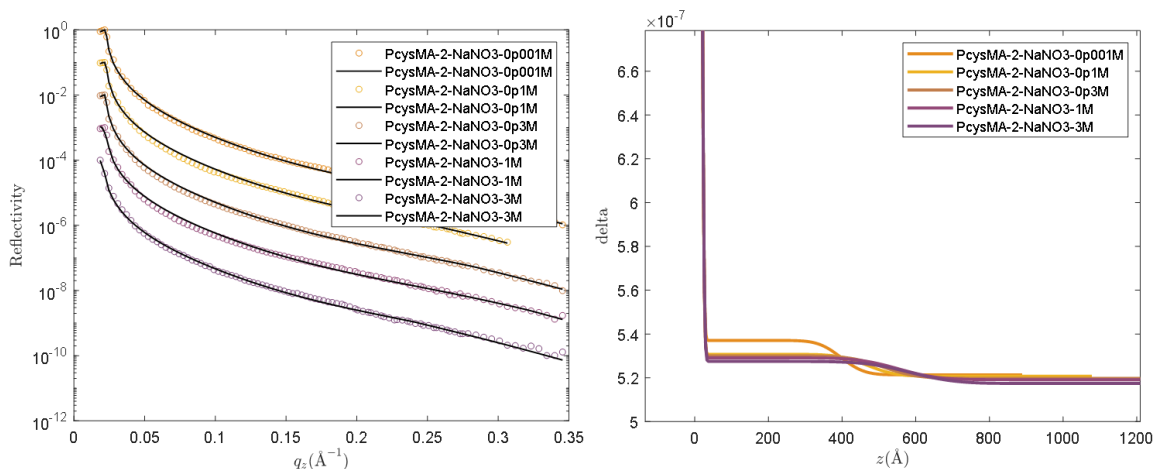


Figure S3. XRR spectra (open circles) and fitting (solid line) of dry and PCysMA brushes in the presence of 1 mM, 0.1 M, 0.3 M, 1 M, and 3M NaNO₃ solutions (left), and corresponding scattering length densities (SLDs) of the PCysMA brush obtained from the best fittings of the XRR data presented (right).

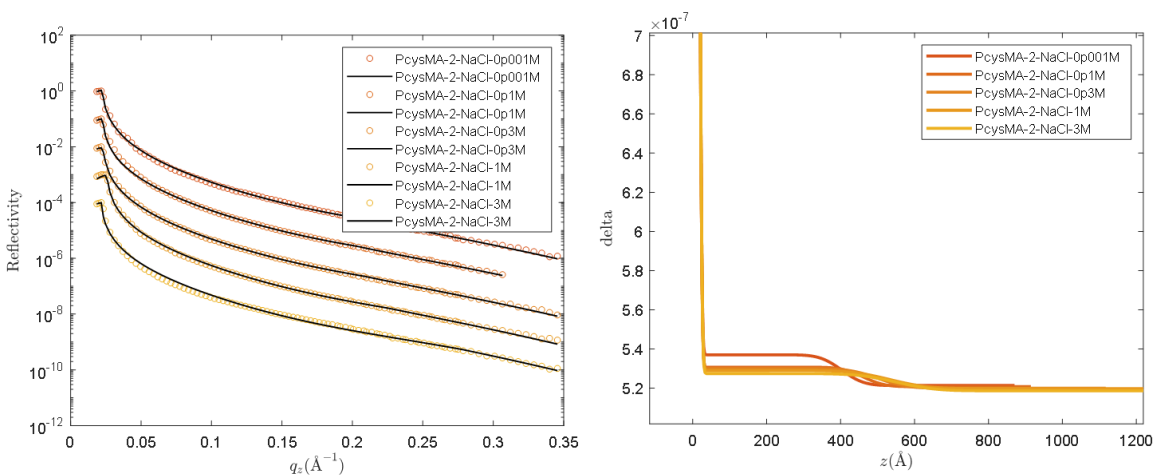


Figure S4. XRR spectra (open circles) and fitting (solid line) of dry and PCysMA brushes in the presence of 1 mM, 0.1 M, 0.3 M, 1 M, and 3M NaCl solutions (left), and corresponding scattering length densities (SLDs) of the PCysMA brush obtained from the best fittings of the XRR data presented (right).

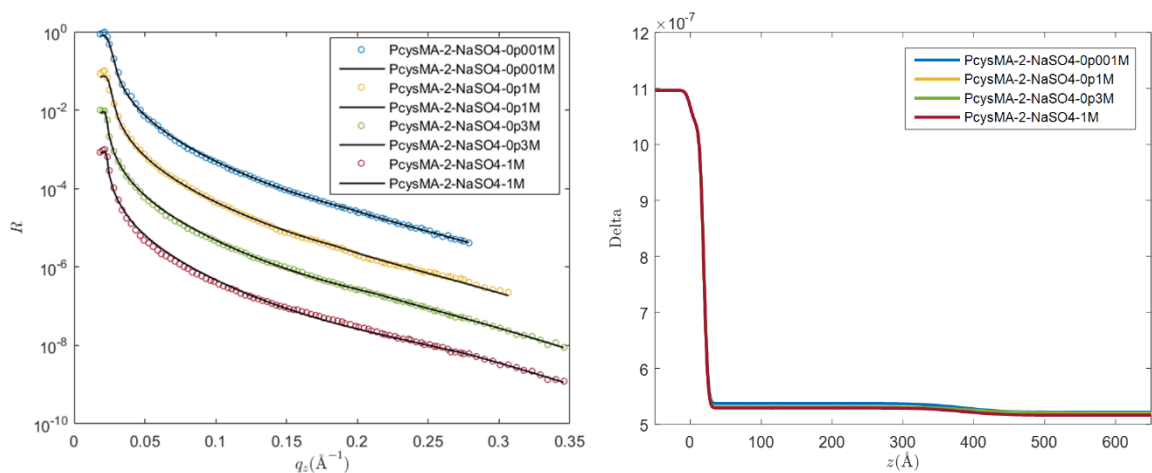


Figure S5. XRR spectra (open circles) and fitting (solid line) of dry and PCysMA brushes in the presence of 1 mM, 0.1 M, 0.3 M, and 1 M Na_2SO_4 solutions (left), and corresponding scattering length densities (SLDs) of the PCysMA brush obtained from the best fittings of the XRR data presented (right).

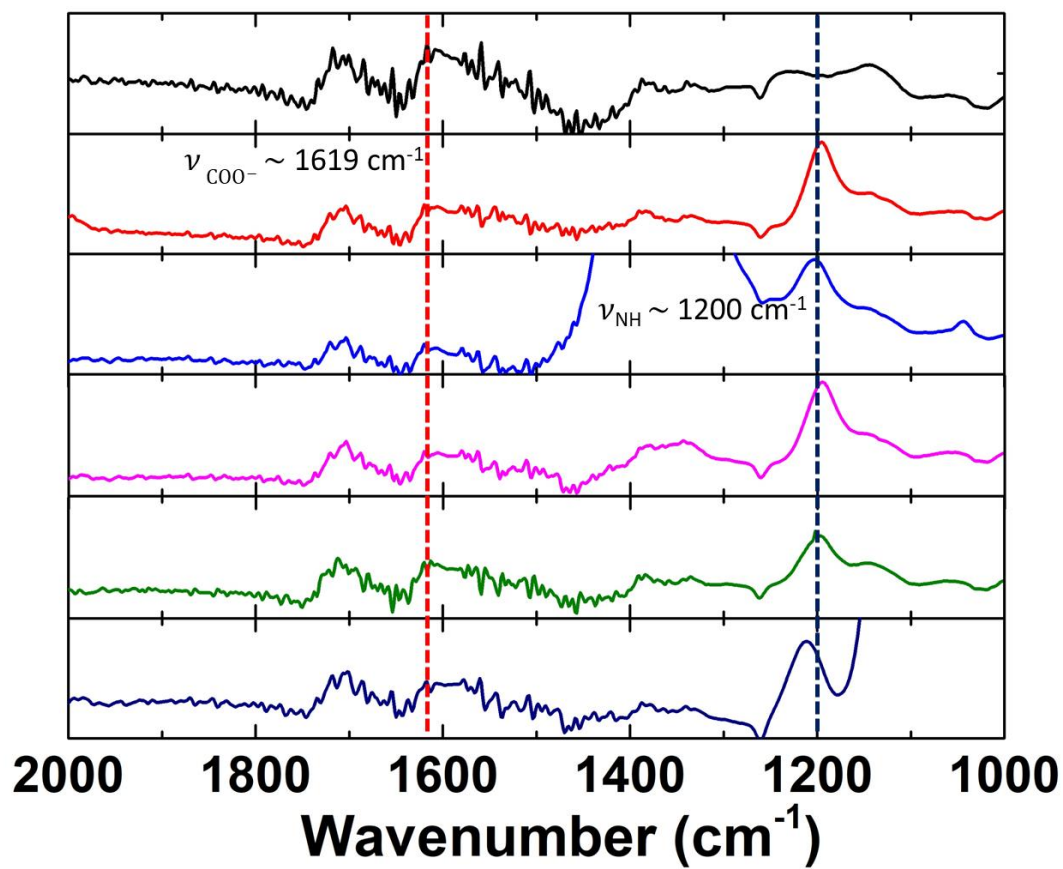


Figure S6. ATR-FTIR spectra of PCysMA brushes in D_2O , 3 M NaSCN, NaBr, NaNO_3 , NaCl, and 1 M Na_2SO_4 solutions (from top to bottom).

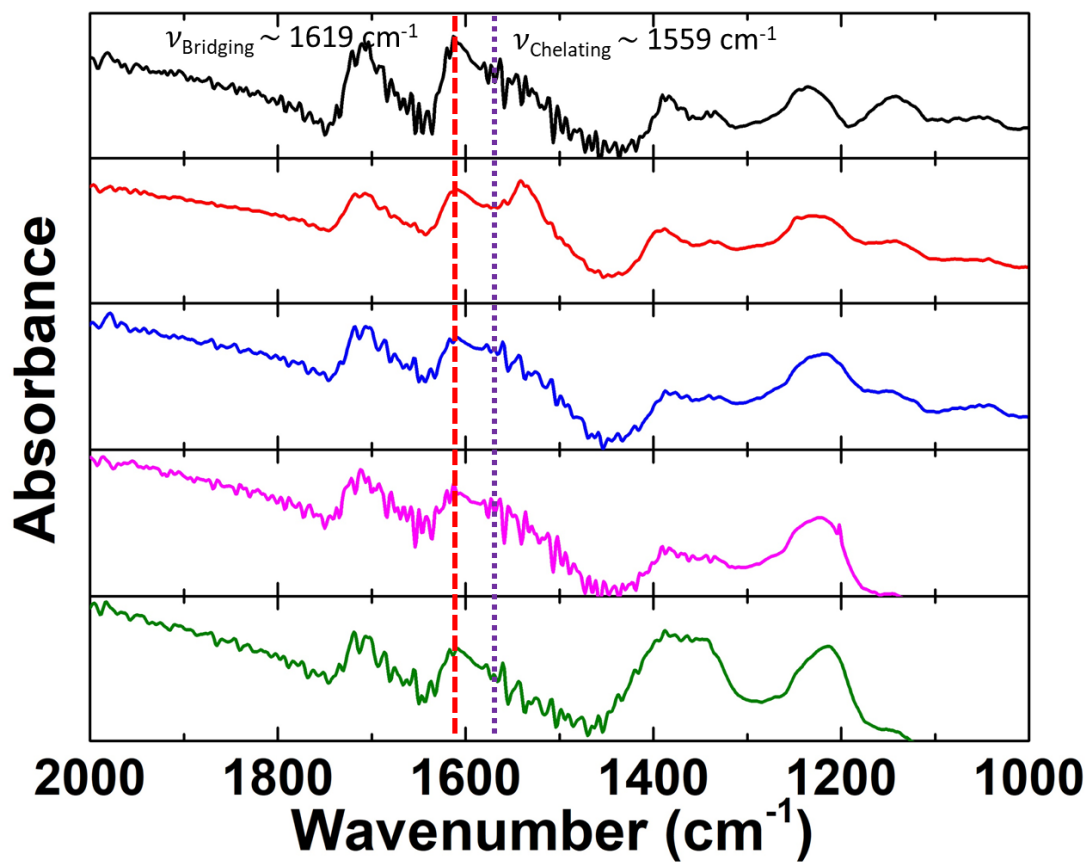


Figure S7. ATR-FTIR spectra of PCysMA brushes in 1 μM , 10 μM , 100 μM , 1 mM , and 10 mM $\text{Ba}(\text{NO}_3)_2$ solutions (from top to bottom).