Supporting Information

Water-Dispersible Cationic Polyurethanes Containing Pendant Trialkylphosphoniums

Supplemental Experimental Procedures

DNA Binding Assay. Agarose gels were prepared from 0.6 g agarose, 60 mL of 1x Tris-acetate-EDTA (TAE, Sigma-Aldrich) and 6 μL of SYBR green. Polymer-only solutions (1 mg/mL in deionized water) and plasmid DNA-only solutions (0.2 μL of 1 μg/μL gWiz-Luc in deionized water, Aldevron) were prepared separately from calculated, desired charge ratios. Polyplexes were incubated at 25 °C for 30 min, and 7 μL of DNA loading buffer (30 wt% glycerol in water) was added to the polyplex solution. The polyplex solution (20 μL) was loaded and electrophoresed in 1x TAE buffer at 70 V for 30 min. DNA gels were imaged using a MultiDoc-it Digital Imaging System (UVP).
**Figure S 1.** $^1$H NMR spectrum of triethyl(1,3-dihydroxypropyl)phosphonium bromide in D$_2$O.

**Figure S 2.** $^{31}$P NMR spectrum of triethyl(1,3-dihydroxypropyl)phosphonium bromide in D$_2$O.
Figure S 3. A representative monomodal DLS trace for phosphonium polyurethanes in aqueous SEC solvent (54/23/23 water/methanol/acetic acid (v/v/v %), 0.1 M sodium acetate).
Figure S 4. A representative DLS trace for phosphonium polyurethanes in water.
**Figure S 5.** FTIR spectra of BD, TEP, and TBP chain extended PU containing 75 mol% HS.

**Figure S 6.** Small-angle X-ray scattering profile of noncharged and phosphonium polyurethanes.
Figure S 7. Wide-angle X-ray diffraction (WAXD) of noncharged and phosphonium polyurethanes.

Figure S 8. Thermogravimetric sorption analysis of noncharged and phosphonium polyurethanes (75 mol% HS) at 25 °C.
**Figure S 9.** Dynamic light scattering of polyplex stability (±/- ratio = 4) in water over 24 h.