Supporting Information

Non-modified CpG oligodeoxynucleotide forming guanine-quadruplex structure complexes with ε-poly-L-lysine induce antibody production as vaccine adjuvants

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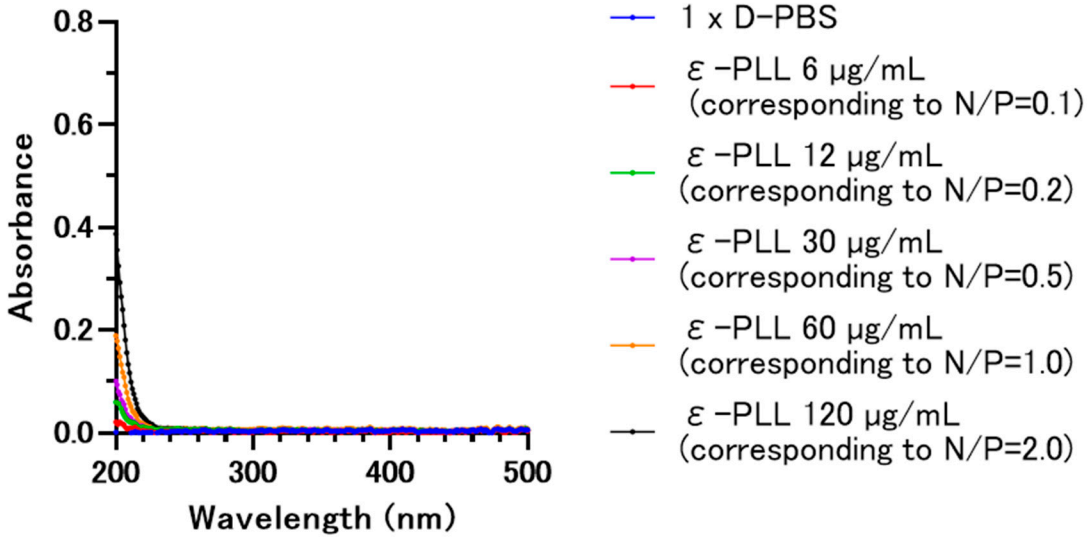

Figure S1. Ultraviolet-visible absorption (UV-vis) spectra of ε-PLL. UV-vis spectra of ε-PLL at concentrations of 6 μg/mL (red), 12 μg/mL (green), 30 μg/mL (purple), 60 μg/mL (orange), and 120 μg/mL (black). Each concentration corresponds to the final concentration of ε-PLL in the complexes at N/P ratios of 0.1, 0.2, 0.5, 1, and 2, respectively.

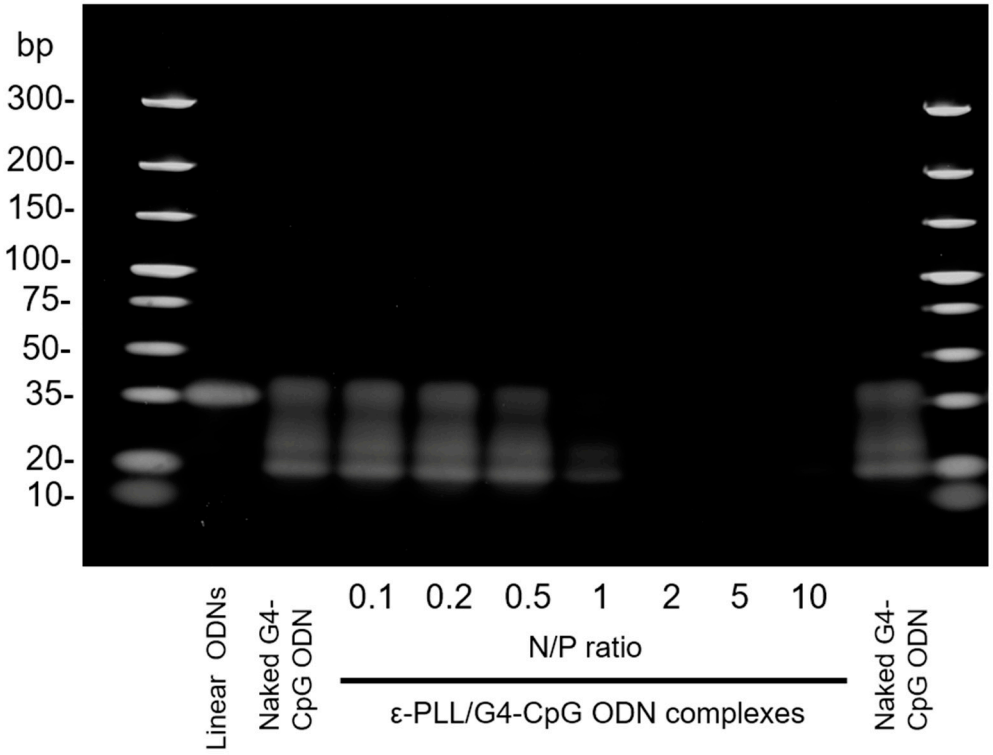

Figure S2. Polyacrylamide gel electrophoresis analysis of G4-CpG ODNs in the ε-PLL/G4-CpG ODN complexes. Electrophoresis was performed using a 10–20% linear gradient polyacrylamide gel in tris-glycine buffer supplemented with 4 mM KCl. Linear ODN is the ssODN38mer which has the same length as G4-CpG ODN (GD3).

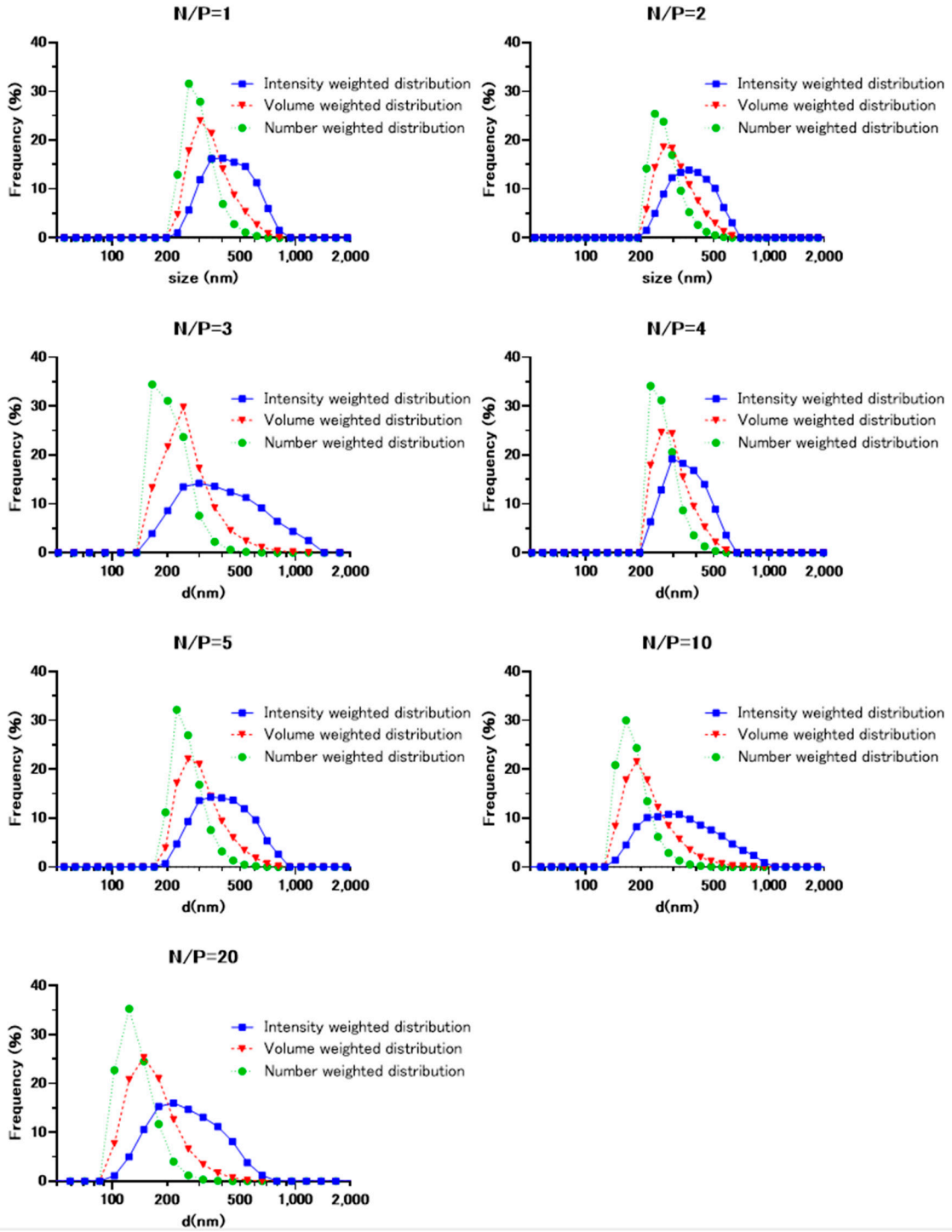

Figure S3. Intensity-, volume-, and number-weighted particle size distributions of ε-PLL/G4-CpG ODN complexes at various N/P ratios. Distribution was calculated using the Marquardt algorithm.

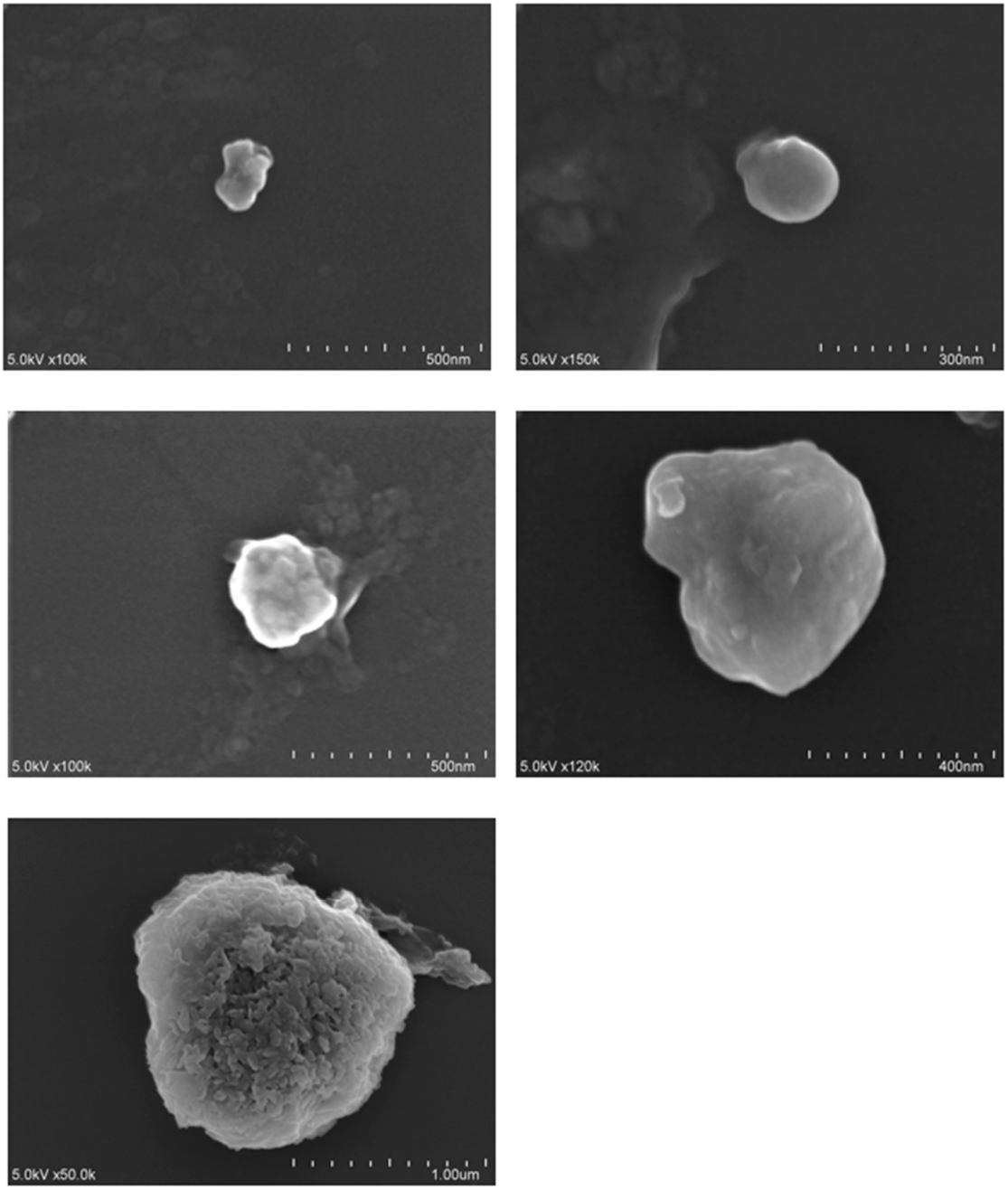

Figure S4. Scanning electron microscopy images of ε-PLL/G4-CpG ODN complexes at an N/P ratio of 10.

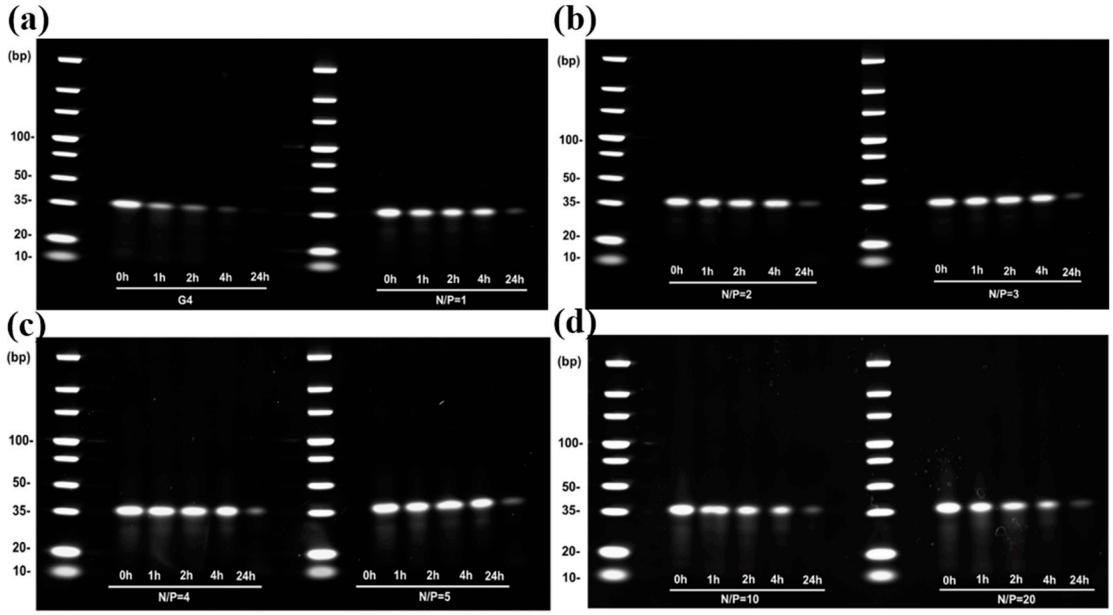

Figure S5. Serum stability of free G4-CpG ODN or ε-PLL/G4-CpG ODN complexes with various N/P ratios in 50% fetal bovine serum after incubation for 1, 2, 4, and 24 h. (**a**) naked G4-CpG ODNs and ε-PLL/G4-CpG ODN complex at N/P = 1, (**b**) ε-PLL/G4-CpG ODN complex at N/P = 2 and N/P = 3, (**c**) ε-PLL/G4-CpG ODN complex at N/P = 4 and N/P = 5, (**d**) ε-PLL/G4-CpG ODN complex at N/P = 10 and N/P = 20, as measured by polyacrylamide gel electrophoresis.

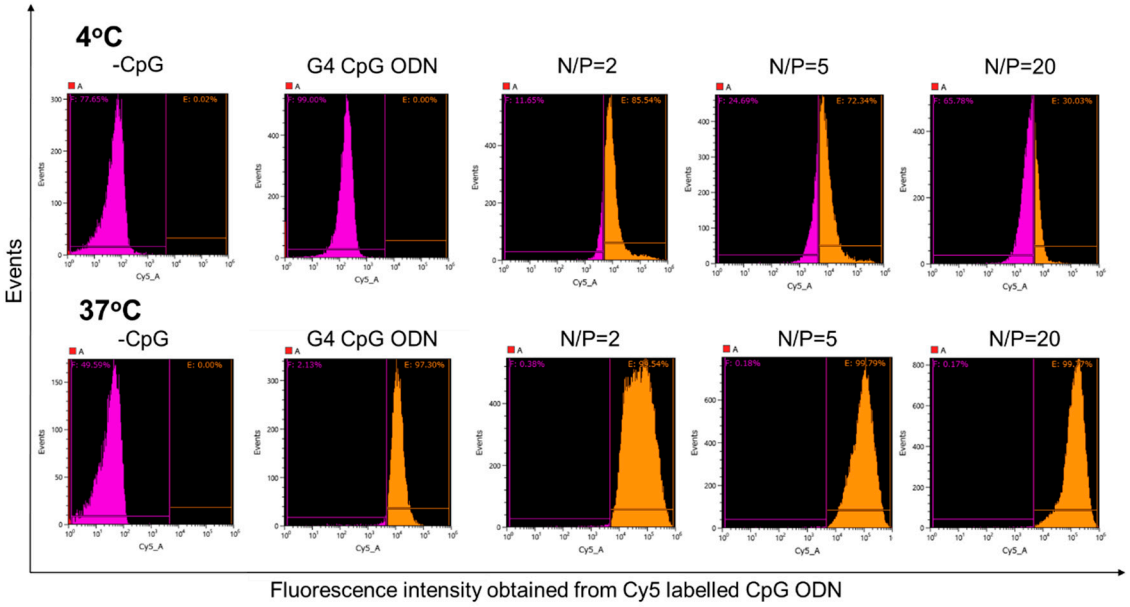

Figure S6. Histogram analysis of fluorescence intensity at 4 °C and 37 °C.

Table S1. Polydispersity index of ε-PLL/G4-CpG ODN complex by cumulants analysis

N/P ratio	1	2	3	4	5	10	20
PDI	0.141	0.026	0.182	0.111	0.145	0.094	0.156