

Supporting Information: “Cross-linked Bio-reducible Layer-by-layer Films for Increased Cell Adhesion and Transgene Expression”

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This data is for additional clarification of non-cross-linked and cross-linked films. Figure S1 shows adsorption as a function of the number of layers adsorbed found from QCM measurements *in situ*. It is shown that there are two distinct adsorption times, dependent on the adsorption of either rPDMAEMA or DNA. DNA layers (even layers) appear to take ~20 min longer to reach 90% adsorption compared to the rPDMAEMA layers. This may be a result of increased size and rigidity of DNA compared to rPDMAEMA. Figure S2 gives the area mass adsorption of each layer obtained from the Sauerbrey Equation. As the number of adsorbed layers increases the area mass adsorption also increases until layer 10, where the adsorption appears to stabilize.

During LbL film assembly, the roughness was found using AFM *Ra* values. It appears that the DNA layers have a higher roughness than rPDMAEMA layers (Figure S3).

XPS data provides the change in chemical composition before and after cross-linking. The change in the summarized spectra is too small to fully investigate (only 2-4 %) and therefore could not be used for further analysis of the cross-linking (Figure S4).

In addition to the data reported in the paper, more detailed calculations are provided for the Flory-Rehner theory, rubber elasticity theory and the calculated Flory-Huggins parameter, χ , in Tables 1-3.

FIGURE CAPTIONS

Table S1. Experimental data of the films [rPDMAEMA/DNA]₁₅.

Table S2. Load density and molar volume found from QCM measurements.

Table S3. Calculated cross-linking density and Flory-Rehner value, χ , for both non-cross-linked and cross-linked films.

Figure S1. QCM adsorption time for 30 layers of (rPDMAEMA/DNA) films.

Figure S2. QCM are adsorption mass for 30 layers of (rPDMAEMA/DNA) films.

Figure S3. Surface roughness (R_a) obtained from AFM height images as a function of the number of layers in triplicate samples.

Figure S4. XPS % spectra of cross-linked [rPDMAEMA/DNA]₁₅.

Table 1

	Non-cross-linked	Cross-linked
Film thickness dry	85 nm	75 nm
Film thickness swollen	118 nm	96 nm \pm 2nm
Film load density	7.95 $\mu\text{g}/\text{cm}^2$	8.27 $\mu\text{g}/\text{cm}^2$
Density	0.674 g/cm^3	0.862 g/cm^3
Young's Modulus	1.8 \pm 0.8 MPa	7.9 \pm 1.1 MPa

Table 2

	Load density	Molar mass	Moles for 15-bi-layers
rPDMAEMA per layer	0.18 \pm 0.033 $\mu\text{g}/\text{cm}^2$	315.90 g/mol	8.56 nmol/ cm^2
DNA per layer	0.35 \pm 0.054 $\mu\text{g}/\text{cm}^2$	325.00 g/mol	16.15 nmol/ cm^2
DIP	0.32 \pm 0.064 $\mu\text{g}/\text{cm}^2$	70.13 g/mol	4.56 nmol/ cm^2
Hexane	0.11 \pm 0.022 $\mu\text{g}/\text{cm}^2$	86.17 g/mol	1.28 nmol/ cm^2

Table 3

	Non-cross-linked	Cross-linked
v_E cross-link density from E	0.242 mmol/cm ³	1.063 mmol/cm ³
+/-	± 0.1076 mmol/cm ³	± 0.147984 mmol/cm ³
Cross-linked	--	0.821 mmol/cm³
+/-	--	± 0.2556 mmol/cm³
Cross-link %	--	15.58 \pm 4.85% (100% conversion)
Error	--	11.263 - 20.97 %
v_{Th} cross-link density QCM mass	--	0.475 mmol/cm³
+/-	--	± 0.105 mmol/cm ³
χ from Flory-Rehner with v_E	1.067 \pm 0.059 (hypothetical)	1.210 \pm 0.104

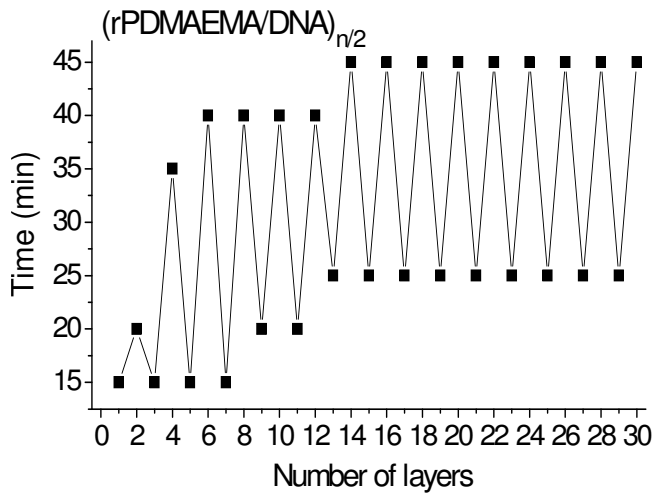
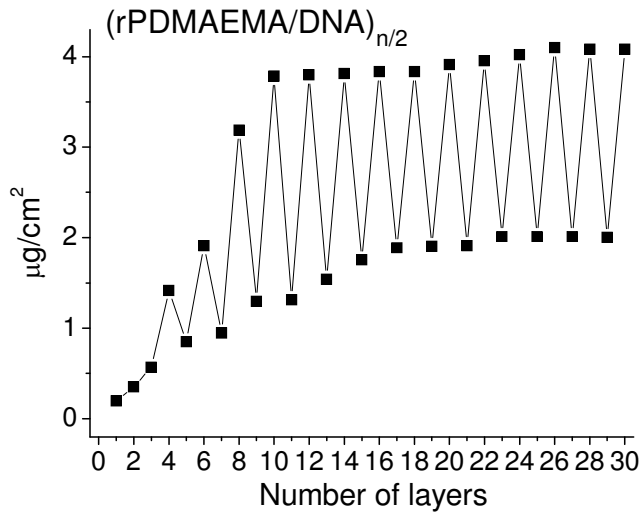
Figure S1**Figure S2**

Figure S3

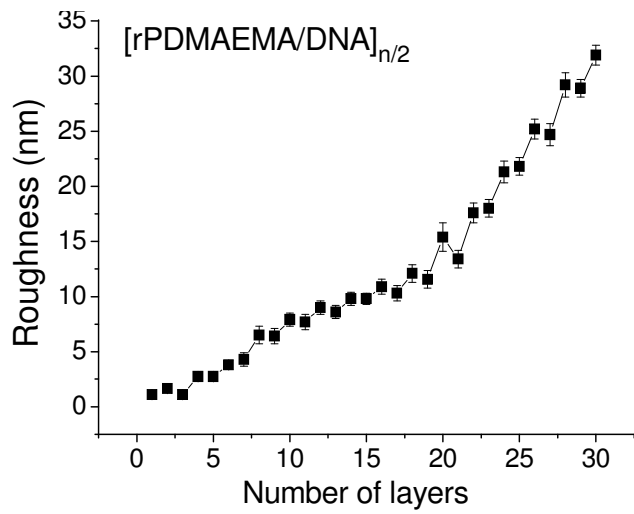


Figure S4

