Electronic Supplementary Material (ESI) for RSC Advances.

Cross-linked Nanofilms for Tunable Permeability Control in a Composite Microdomain System

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Glucose permeation rates of non-cross-linked bilayers

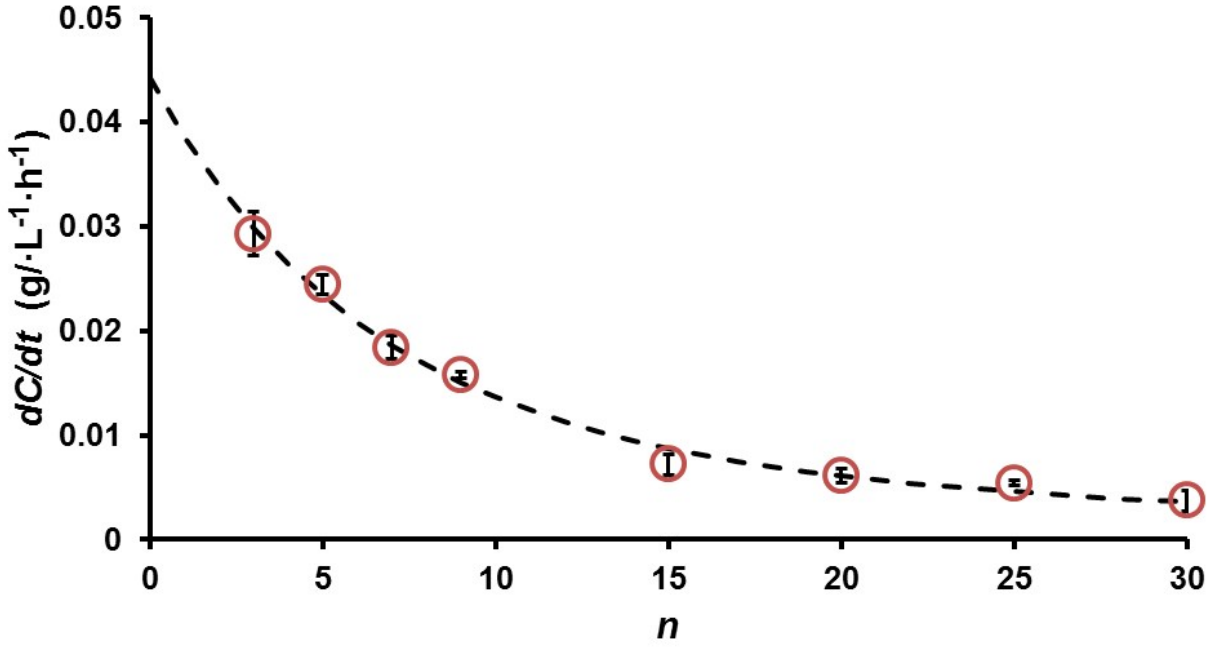

Figure S1. The glucose permeation rate (*dC*/*dt*) through PAH/PSS bilayers composed of non-cross-linked PSS-$[PDADMAC/PSS]_5$-$[PAH/PSS]_n$ (red ○). Error bars represent 95% confidence intervals for three separate nanofilm constructs.

Energy Dispersive X-ray Spectroscopy (EDS) spectra

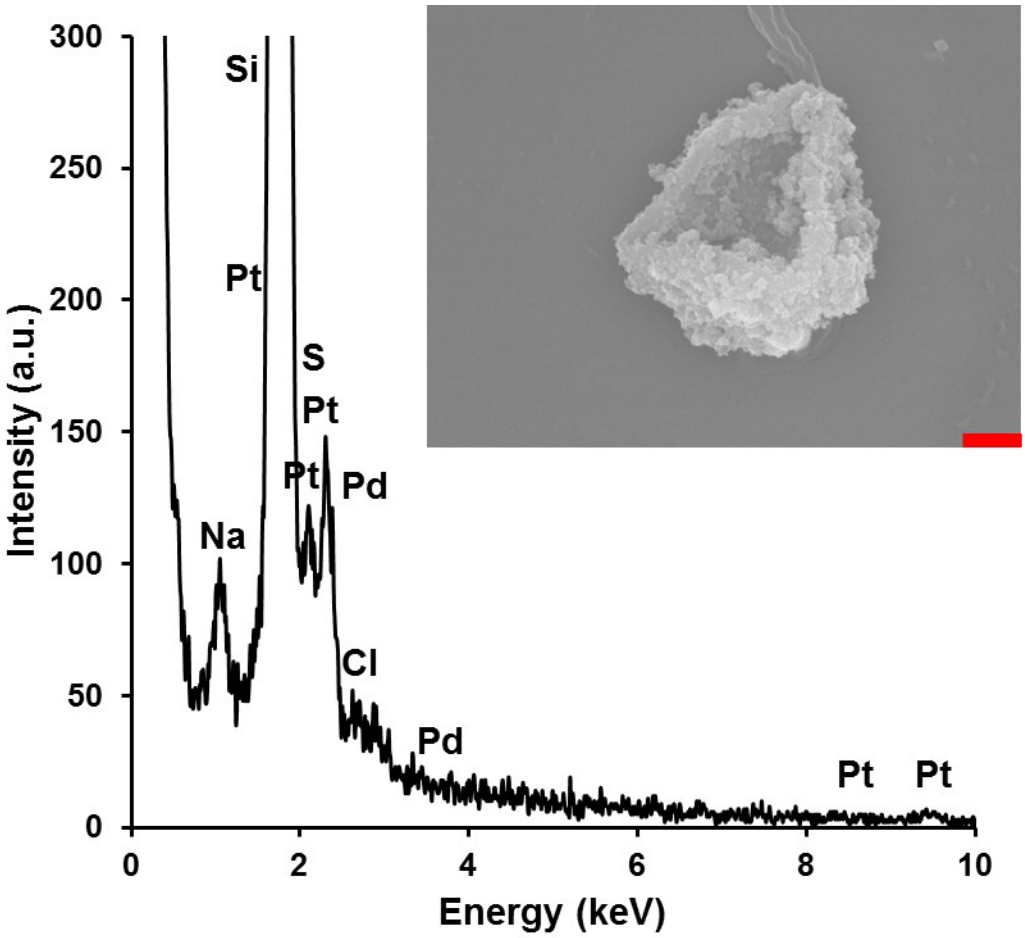

Figure S2. Energy Dispersive X-ray Spectroscopy (EDS) spectra for sputter coated (4nm of palladium/platinum) cross-linked $[PDADMAC/PSS]_5$-$[PAH/PSS]_9$ microcapsule samples, prepared on silicon substrates. Absence of calcium in the spectra confirms complete dissolution of $CaCO_3$. Platinum, palladium, and silicon peaks result from the silicon substrate and the sputter-coated film.

Non-normalized average lifetime data from oxygen quenching experiments

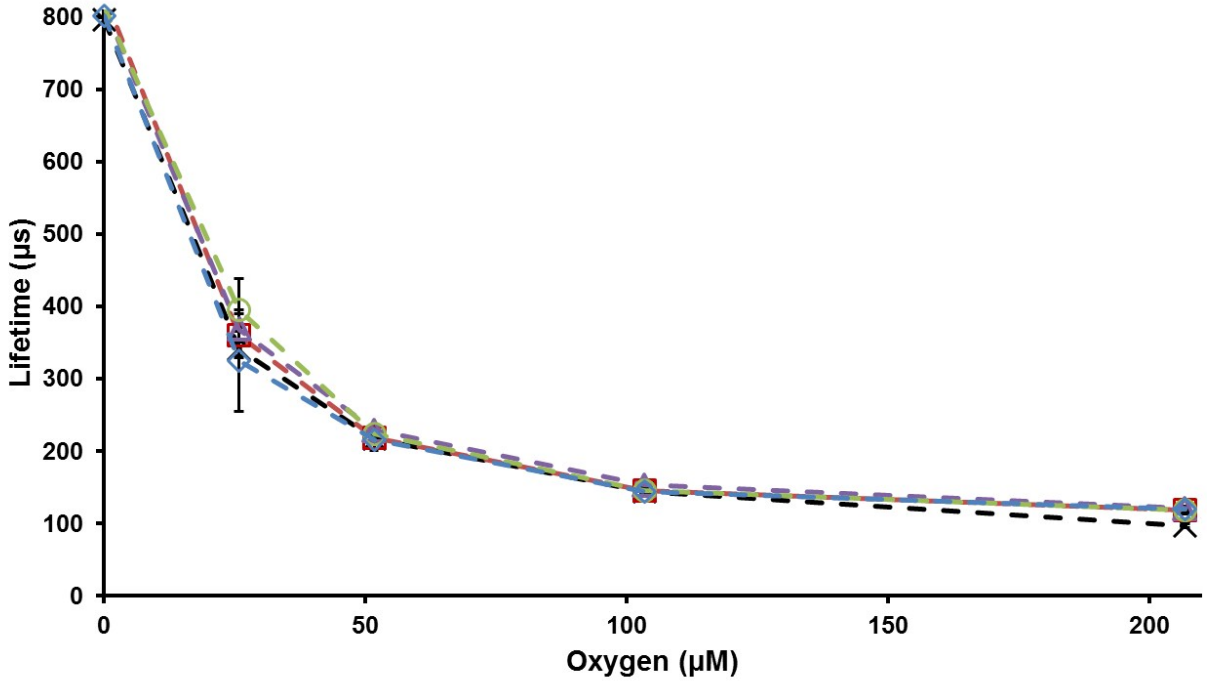

Figure S3. Lifetime against varying oxygen concentrations for MPAC hydrogels containing micro domains bound by different nanofilm architectures. The cross-linked nanofilm architectures are represented by $[PDADMAC/PSS]_5$-$[PAH/PSS]_n$ where n = 3 (red □) , n = 5 (purple Δ), n = 7 (green ○), n = 9 (blue ◊) and uncross-linked nanofilm architecture $[PDADMAC/PSS]_5$-$[PAH/PSS]_9$ (black ×). Error bars represent 95% confidence intervals for three separate MPAC hydrogels. The dashed lines are provided only as a guide to the eyes.

Non-normalized average lifetime data during glucose challenges

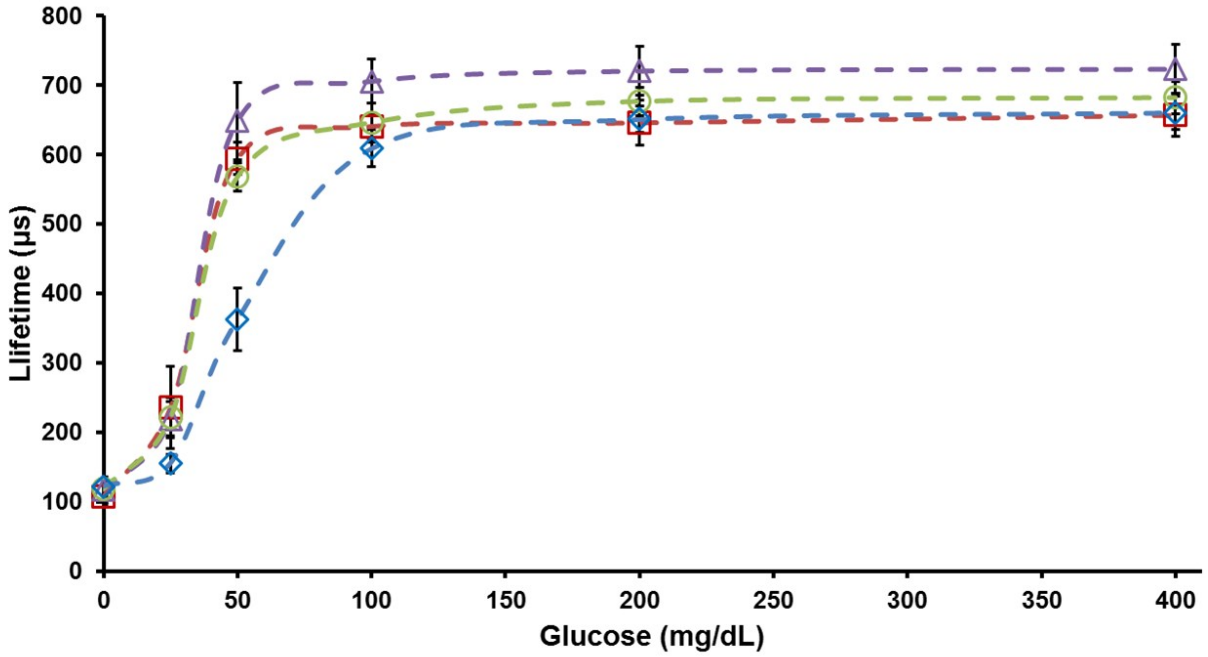

Figure S4. Non-normalized sensor response curves of MPACS containing non-cross-linked $[PDADMAC/PSS]_5$-$[PAH/PSS]_n$ nanofilm bounded micro domains. n = 3 (red □), n = 5 (purple Δ), n = 7 (green ○) and n = 9 (blue ◊). Error bars represent 95% confidence intervals for three separate MPAC hydrogels. The dashed lines are provided only as a guide to the eyes. These values were normalized to the maximum lifetime and reported as the response curve in Figure 5A.

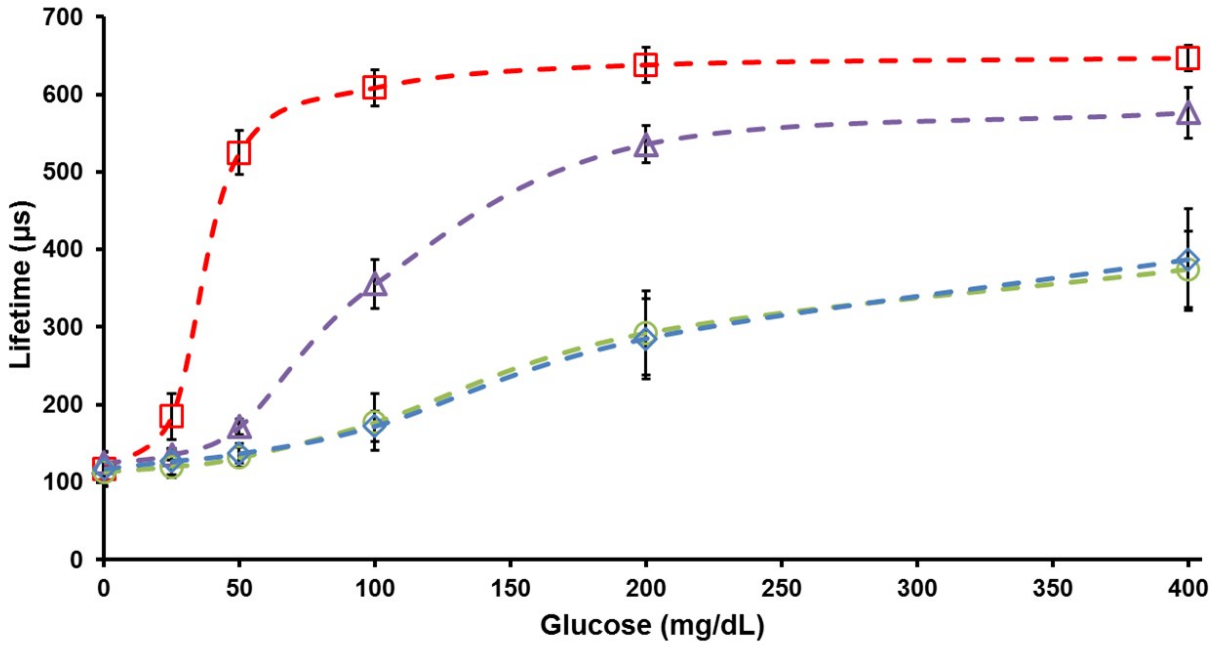

Figure S5. Non normalized sensor response curves of MPACs containing cross-linked $[PDADMAC/PSS]_5$-$[PAH/PSS]_n$ nanofilm bounded micro domains. n = 3 (red □) , n = 5 (purple Δ), n = 7 (green ○) and n = 9 (blue ◊). Error bars represent 95% confidence intervals for three separate MPAC hydrogels. The dashed lines are provided only as a guide to the eyes. These values were normalized to the maximum lifetime and reported as the response curves in Figure 5B.