An ionic hydrogel for accelerated dopamine delivery via retrodialysis

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SUPPORTING INFORMATION

Synthesis of ionic dopamine acrylate monomer (iDAA): The synthesis of iDAA was carried out using an anionic exchange resin (AER), Amberlyst A-26 (OH) from Alfa Aesar (exchange capacity 0.8 mol/l). An excess (>10% p/V) of commercial acrylic acid (Sigma Aldrich) in water and 0.05M of dopamine chloride (Alfa Aesar) in methanol. The AER column was loaded with an excess of acrylic acid solution (>10% p/V). Then, a 0.05M dopamine chloride solution in methanol was passed slowly through the column. The final product, dopamine acrylate (iDAA), was collected in the form of a methanol solution. Methanol was removed under reduced pressure, and the iDAA was characterized by ^{1}H NMR (400 MHz, Deuterium Oxide) δ 6.86 – 6.69 (m, 3H, aromatic), 6.13 – 5.60 (m, 3H, $C\underline{H_2}$=$C\underline{H}$), 3.17 (t, 2H, $\underline{CH_2}$-CH_2-NH_3), 2.82 (t, 2H, CH_2-$\underline{CH_2}$-NH_3).

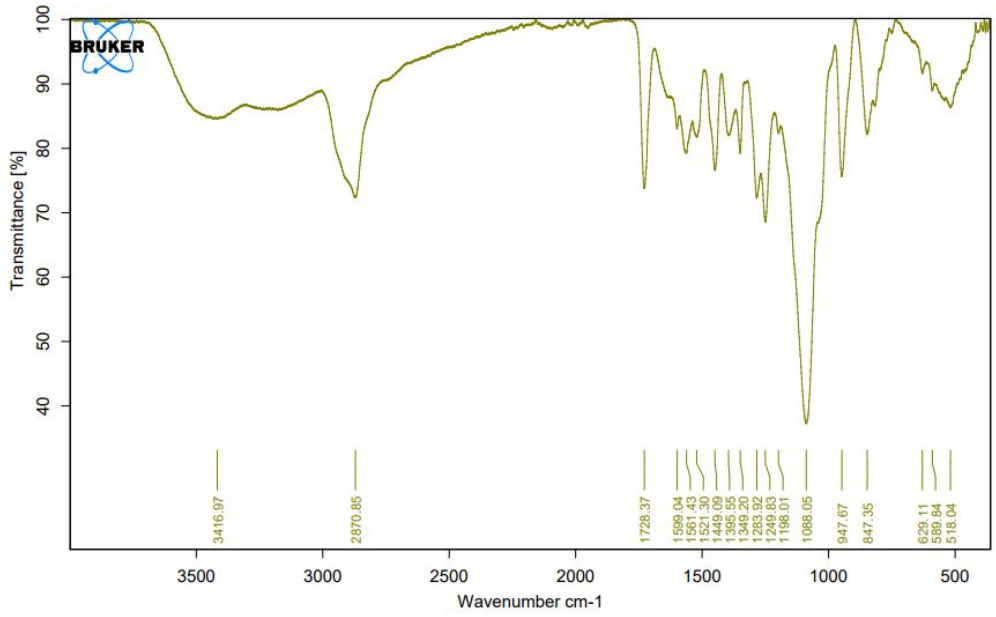

Figure S1 shows the FTIR-ATR spectrum of the as-synthetized PEG-based hydrogels. The distinctive signals of the polymer backbone were observed, corresponding to the ester carbonyl stretch at 1729 cm-1 and the ether stretch at 1088 cm−1. In addition, CH stretches at 2870 cm−1 , and the CH2 bending stretches at 1449 cm−1 were also observed. We attributed the broad band at 3416 cm−1 to the presence of water in the sample. The characteristic bands of dopamine were also present in the spectra with the amine bending and stretching modes at 1599 and 3300 cm−1. Finally, quantitative monomer conversion

was demonstrated by the absence of the characteristic C=C stretch bands in the fingerprint region at 1640 and 660 cm-1 .

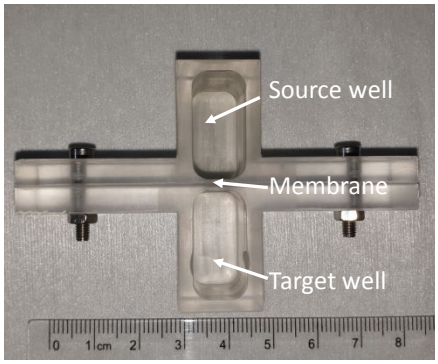

Figure S2: Custom made sample holder used for diffusion experiments featuring the Source and Target wells sandwiching the Membrane.

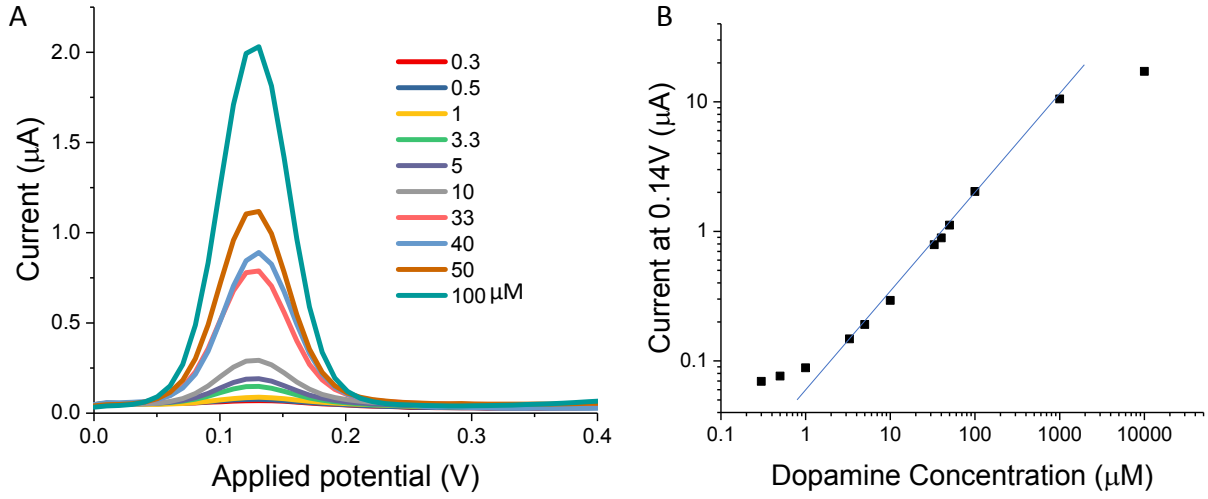

Figure S3: Example current vs potential (A) and calibration curve showing linear regime (B) from DPV experiments for dopamine concentrations from 0.3 to 100 μM. DPV measurements were performed using a three electrode configuration with a glassy cabon working electrode, Pt-wire counter electrode and Ag/AgCl reference electrode using an Metrohm Autolab Potentiostat (model PGSTAT128N).