Electronic Supplementary Material (ESI) for RSC Applied Polymers.

Supporting Information

Porous Bioelectonic Substrates for Simple Electrochemical Conjugation and Subsequent, Controlled Electrochemical Release of Antisense Oligonucleotides Drug

Sara Beikzadeh[a,b], Devon T. Bryant[a], Alireza Akbarinejad[c], Lisa I.Pilkington[a], Anthony R. J. Phillips[d], and Jadranka Travas-Sejdic[a,b*]

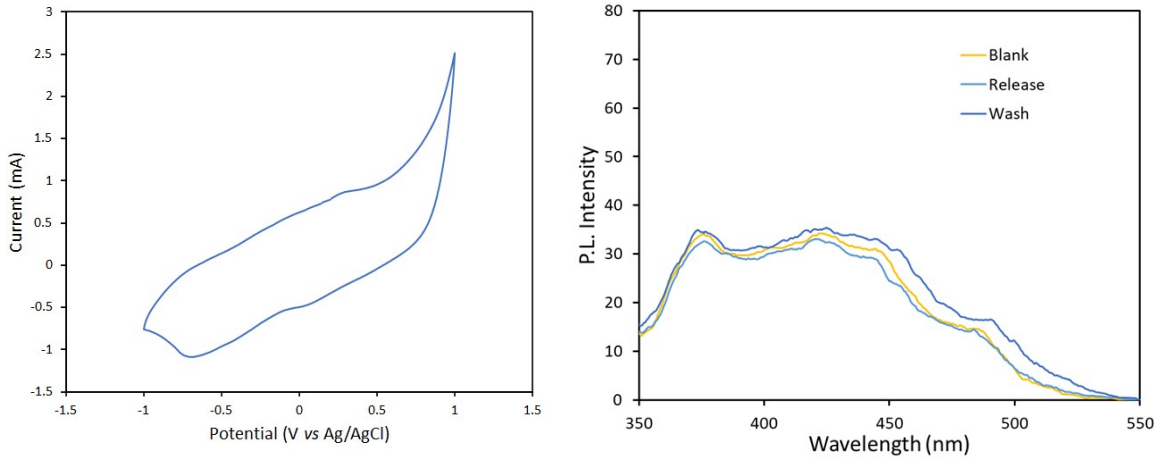

Figure SI.1. a) The CV profile of the terpolymer-coated CC at a lower scan rate of 5 mV/s. b) The fluorescence emission spectra of the electrochemical release of 2ME from terpolymer-coated CC (λex = 330 nm) without the electrochemical oxidative coupling at +1.0 V (Ag/AgCl) on the CC; The electrodes were immersed in the 2ME solution for 1 minute then, CC is kept in a PBS solution for 30 min before release (wash). 2ME was then released at −0.8 V from the CC substrate into PBS containing 1 × 10−3 M o-phthalaldehyde and alanine. PBS solution of 1 × 10−3 M o-phthalaldehyde and alanine was used as the blank sample.

In order to exclude any electrostatic and nonspecific interaction of 2ME on the substrates. The electrodes were immersed in the 2ME solution for 1 minute, then the subsequent wash and release steps were performed in PBS. No amount of 2ME in the wash solution and after the electrochemical release step was observed. This observation indicated that there was no absorption of extra free 2ME onto the substrate's surface during the conjugation process without the external potential which supports the successful capture and release process without the interference of nonspecific interactions of 2ME on the substrates.

Optimization of the terpolymer composition

The characteristic emission peak of the released fluorescent ODNs in PBS at 518 nm, from both functionalized CC and EF substrates with different terpolymer compositions are shown in Figure SI. 2.

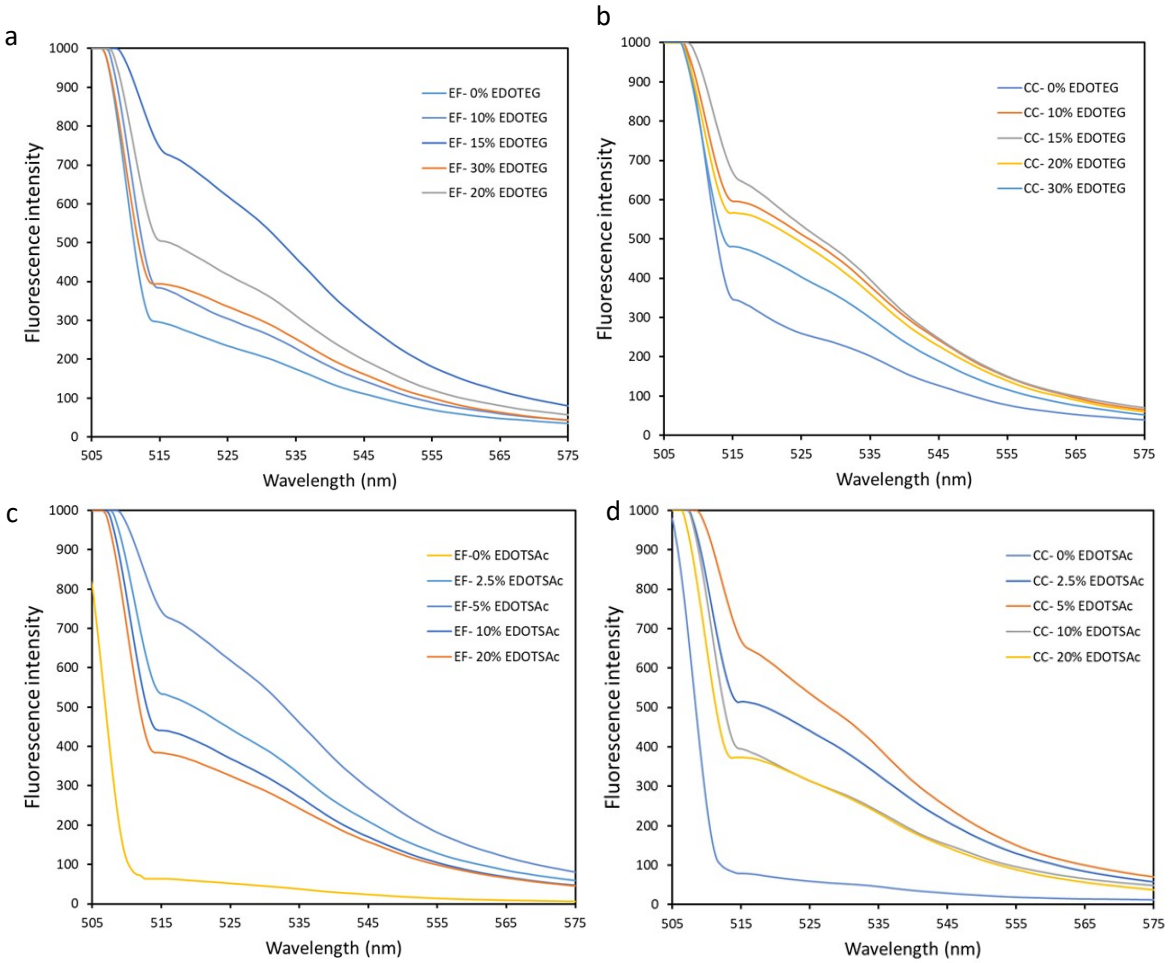

Figure SI. 2. Fluorescence spectra (λ_{ex} = 493 nm) of the connexin43 DNA oligo (ODN) released from the terpolymer-functionalized a) EF and b) CC upon optimization of the fraction of EDOTEG (0 to 30 mol %) in the termonomer feed, the fraction of EDOTSAc was constant at (5 mol %). Fluorescence spectra (λ_{ex} = 493 nm) of ODN released from the terpolymer-functionalized c) EF and d) CC upon optimization of the fraction of EDOTSAc (0 to 20 mol %) in the termonomer feed, the fraction of EDOTEG was constant at 15 mol %.

The fluorescence intensities of the released ODN from terpolymer-coated EF and CC with the optimised terpolymer composition:

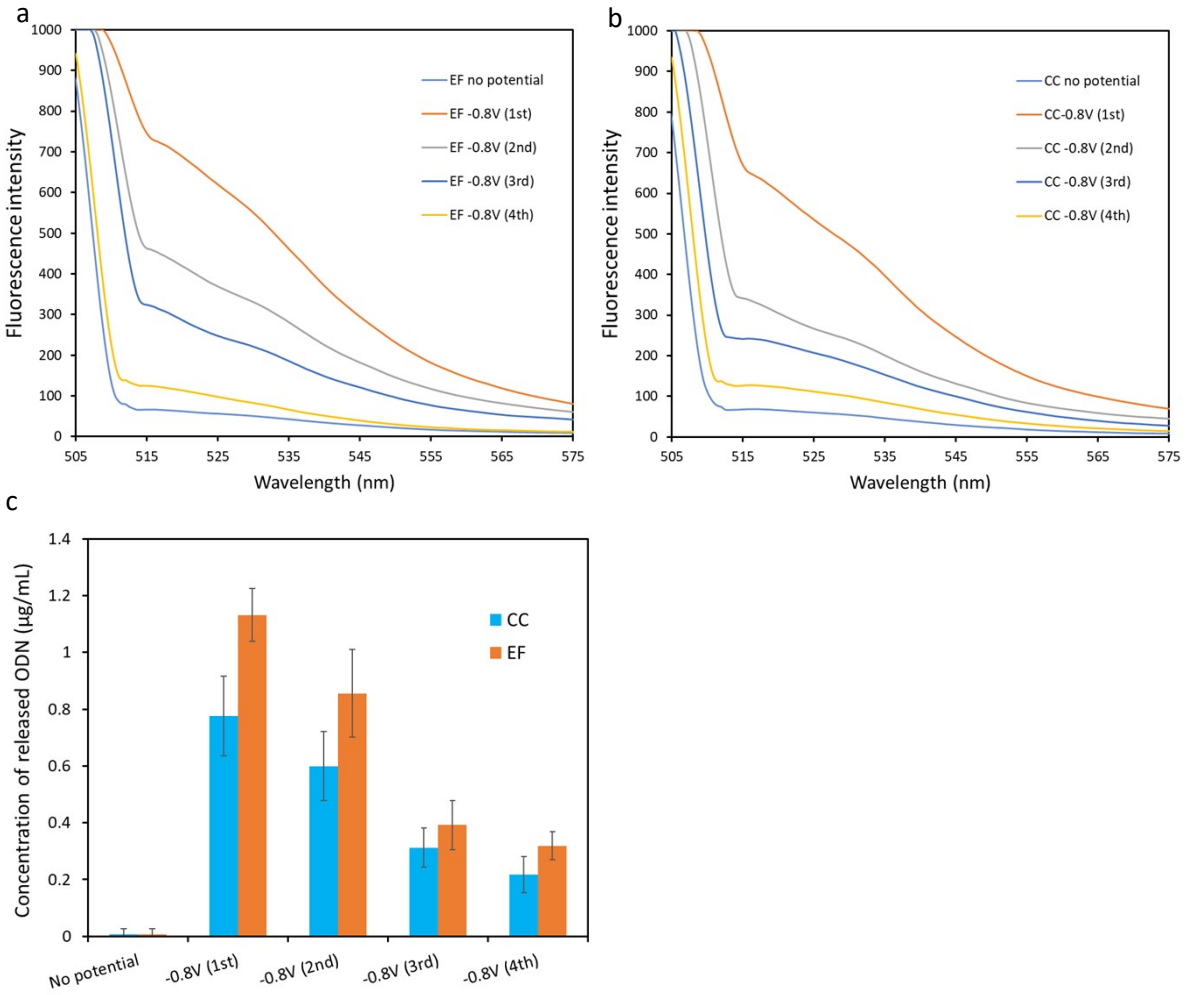

Figure SI. 3. The fluorescence intensities confirm the electrochemical release of fluorescent ODN from terpolymer-coated (a) EF and (b) CC with the optimized terpolymer composition (λ_{ex} = 493 nm). The release of fluorescent ODN was performed at -0.8 V in PBS in 4 × 5 min cycles (n= 3). c) The detected concentrations measured using the NanoDrop confirmed the electrochemical release of ODNs from terpolymer-coated EF and CC with optimized terpolymer composition (λ_{ex} = 320 nm). The release of non-fluorescent ODN was performed at -0.8 V in PBS in 4 × 5 min cycles (n= 3).