Electronic Supplementary Material (ESI) for Journal of Materials Chemistry B.

A Graphene Oxide/Conductive Polymer Nanocomposite for Electrochemical Dopamine Detection: Origin of Improved Sensitivity and Specificity

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Electropolymerization of PEDOT/PSS Nanocomposite Film

The morphology and sensor performance of PEDOT films doped with poly(styrenesulfonate) (PSS) were evaluated as a comparison to GO/PEDOT nanocomposites. GCEs were polished with 1.0 and 0.05 μm alumina slurries and cleaned by sonication in 100% ethanol followed by H_2O. The GCEs were electrochemically pretreated in PBS by applying a cleaning voltage pulse (-2 V, 250 s), followed by a cyclic voltammetry sweep (0.3 V to 1.3 V, 100 mV s^{-1}, 5 cycles). Following pretreatment, PEDOT/PSS nanocomposite films were electrochemically deposited onto GCEs from a polymerization solution composed of EDOT (0.2 M) and poly(sodium-4-styrenesulfonate) (M_W ~ 70,000; 0.1 M). An oxidizing current of 20 μA was applied through the GCE for 200 s to carry out the polymerization reaction.

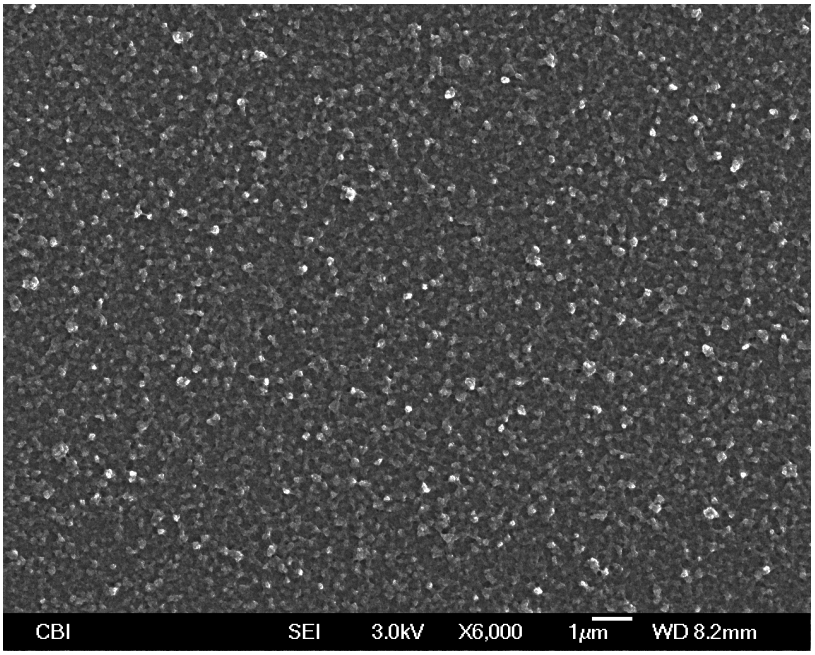

Figure S1: SEM Image of PEDOT doped with poly(styrenesulfonate) exhibiting a representative blister-like morphology.

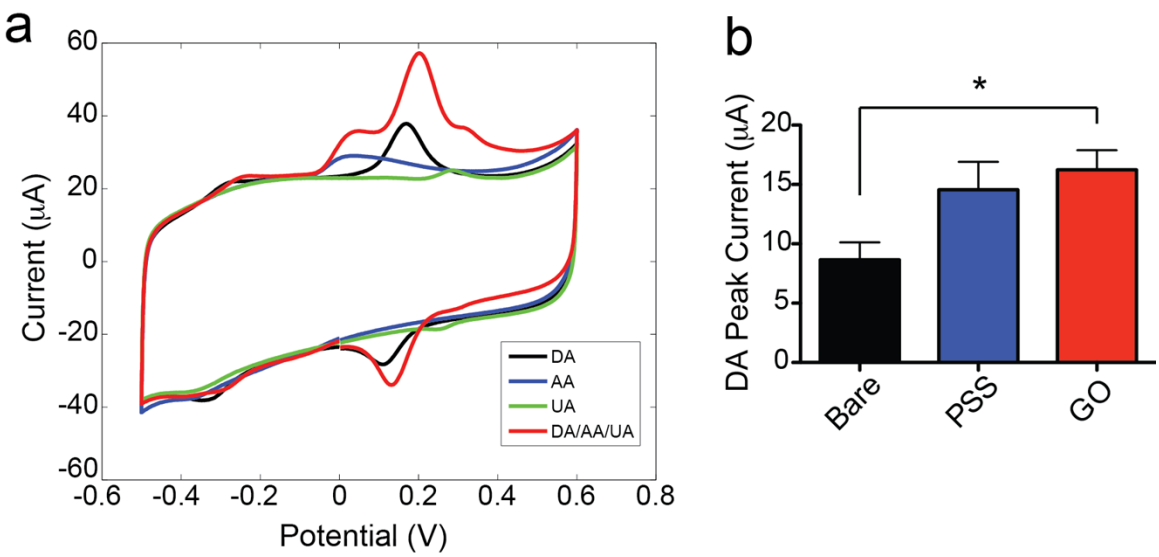

Figure S2: Sensor Performance of Conventional PEDOT. (a) CV of GCEs modified with PEDOT doped with poly(styrenesulfonate) (PSS) in solutions containing 100 μM DA, 1 mM AA, 100 μM UA alone or in combination. AA and DA oxidize at similar potentials at the PEDOT/PSS electrode surface resulting in peak overlap on the CV curve when the analytes are presented in combination. (b) Peak current in response to 100 μM DA at bare GCEs or GCEs modified with PEDOT doped with PSS or GO (* $p < 0.05$; $n = 6$).

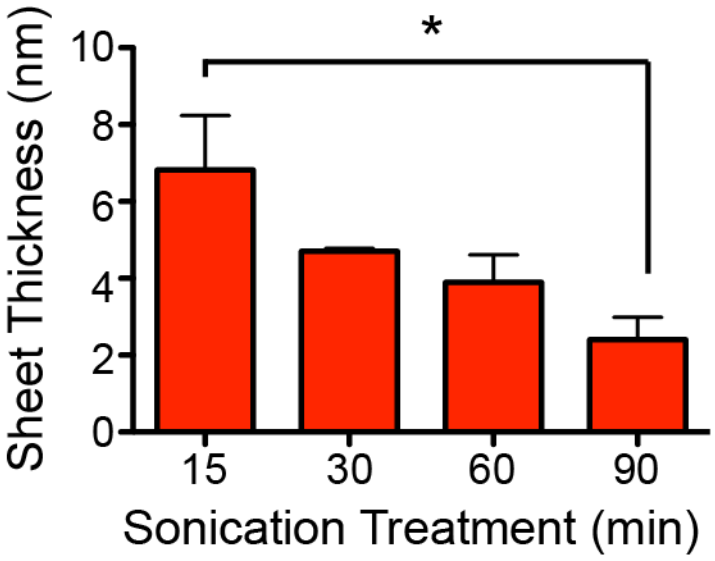

Figure S3: Effect of Sonication Treatment on GO Nanosheet Thickness. Average thickness of GO nanosheets sonicated for 15, 30, 60 and 90 min. Atomic force microscopy was used to measure the height profile of GO sample preparations (* $p < 0.05$; $n = 3$). The thicknesses of at least 20 GO nanosheets were measured for each sample.