

Polyethyleneimine Carbon Nanotube Fiber Electrodes For Enhanced Detection of Neurotransmitters

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In the supporting information, we depict the co-detection of 2 μM dopamine and 2 μM serotonin using polyethyleneimine (PEI) CNT fiber microelectrodes. The two biomolecules are co-detected based on the different shape and position of their reduction peaks.

Co-detection of Dopamine and Serotonin

We have explored the co-detection of dopamine and serotonin using flow injection analysis in Figure S-1. Two μM serotonin and 2 μM dopamine were detected using a PEI-CNT fiber microelectrode (Figures S-1A and S1-B). Figure S-1C shows a cyclic voltammogram of a mixture of 2 μM dopamine and 2 μM serotonin. The applied waveform is from -0.4 to 1.0 V and back at 400 V/s, the typical dopamine waveform, because the serotonin waveform does not detect the reduction peak of dopamine.⁶ The two molecules have an oxidation peak at the same potential; thus, they must be differentiated by their reduction peak. The reduction peak for dopamine is at approximately -200 mV, while the reduction peak for serotonin is a broad shoulder from 0 to 200 mV, a 400 mV difference. Previous work from our lab showed that dopamine and serotonin and can be differentiated on CFMEs dipcoated into CNT suspensions in DMF by 200 mV.⁶ The data here for PEI-CNT microelectrodes is similar. Therefore, the PEI-CNT fiber microelectrodes allow for the co-detection of serotonin and dopamine without the requirement of being dip-coated in CNTs.

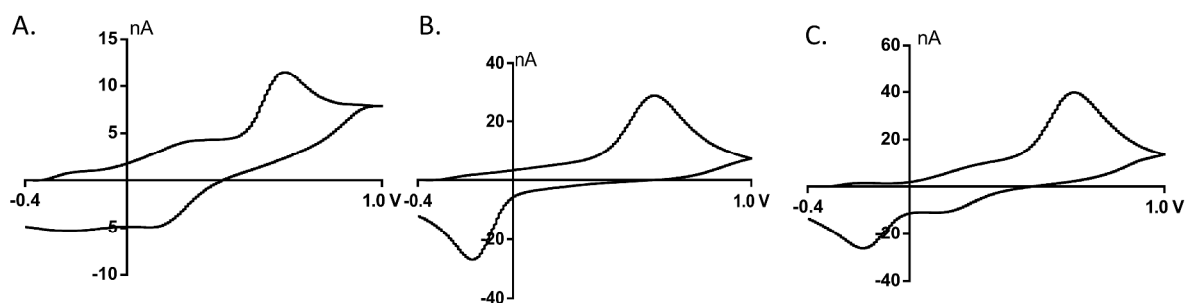


Figure S-1: Co-detection of serotonin and dopamine at PEI-CNT fiber microelectrodes. A). Cyclic voltammogram of 2 μM serotonin B). Cyclic voltammogram of 2 μM dopamine. C). Cyclic voltammogram of a mixture of 2 μM serotonin and 2 μM dopamine using a PEI CNT fiber microelectrode. The two molecules are differentiated from their reduction peaks. The reduction peak for dopamine is at approximately -200 mV, while the reduction peak for serotonin is a broad shoulder from 0 to 200 mV, a 400 mV difference.