# Receptor-Based Detection of DNT using Modified Three-Dimensionally Ordered Macroporous Carbon Electrodes

*Melissa A. Fierke,[†] Eric J. Olson, Philippe Bühlmann,* and Andreas Stein**

Department of Chemistry, University of Minnesota, 207 Pleasant Street SE, Minneapolis, Minnesota 55455

*To whom correspondence should be addressed.

E-mail: buhlmann@umn.edu (P.B.), phone: 612-624-1431, fax: 612-626-7541.

E-mail: a-stein@umn.edu (A.S.), phone: 612-624-1802, fax: 612-626-7541.

†Current address: Department of Chemistry, Hamline University, 1536 Hewitt Avenue, Saint Paul, Minnesota 55104

## Supporting Information

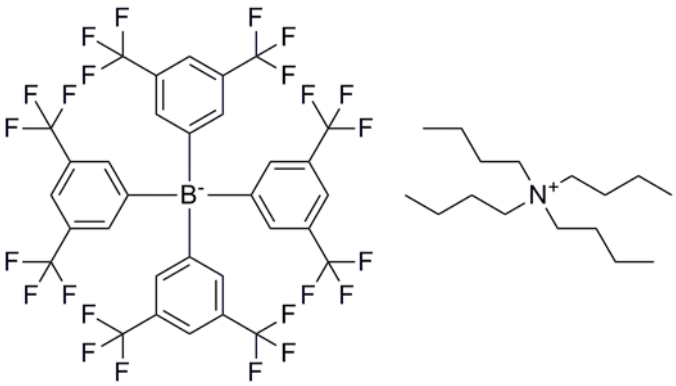

**Figure S1.** Structure of the electrolyte tetrabutylammonium tetrakis[3,5-bis(trifluoromethyl)phenyl]borate ($NBu_4BArF_{24}$).

**Detection of DNT in the Presence of Potential Interferents.** Functionalized 3DOM carbon electrodes were tested for response to DNT in the presence of two potential interferents, nitrobenzene and phenol (Figure S2). After a baseline voltammogram (0 mM DNT) was measured, the response to nitrobenzene was tested. In the presence of 1.0 mM nitrobenzene, no response was observed, and the total current decreased slightly due to nitrobenzene blocking the surface. The electrode was responsive to DNT (0.6 mM) even in the presence of nitrobenzene (1.0 mM), producing a peak at –2.5 V.

When a functionalized electrode was tested in the presence of phenol (1.0 mM), the total current decreased, as was observed in the nitrobenzene case, indicating no response to phenol. When DNT (0.6 mM) was added to the system, no response to DNT was observed. It was hypothesized that the phenol was blocking the receptor sites. In order to test this hypothesis, the electrode was placed under vacuum overnight in order to remove the phenol, which has a high vapor pressure, from the electrode. After removal of the phenol, the receptor once again responded to DNT.

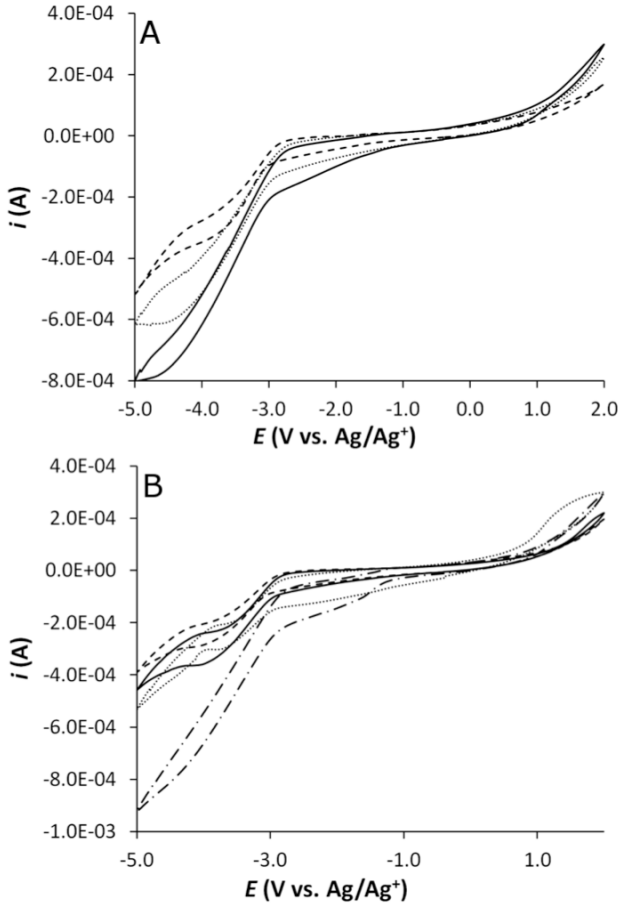


**Figure S2.** CV characterization of fully functionalized 3DOM carbon electrodes in the presence of interferents in benzotrifluoride/100 mM $NBu_4BArF_{24}$. A scan window of –5 to 2 V starting at –0.4 V was used, with a scan rate of 10 $mV \cdot s^{-1}$. Only cycle 2 is shown. The interferents used were (A) nitrobenzene (····· 0 mM nitrobenzene, 0 mM DNT), (– – – – 1.0 mM nitrobenzene, 0 mM DNT), (—— 1.0 mM nitrobenzene, 0.6 mM DNT) and (B) phenol (····· 0 mM phenol, 0 mM DNT), (– – – – 1.0 mM phenol, 0 mM DNT), (—— 1.0 mM phenol, 0.6 mM DNT), (— · — 0 mM phenol, 1 mM DNT after vacuum removal of phenol).

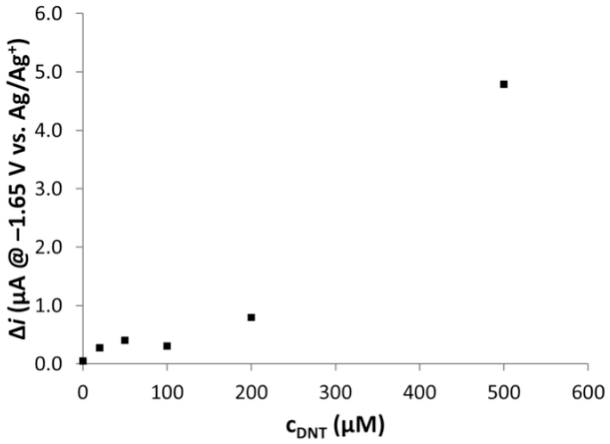


**Figure S3.** Dependence of the current observed by SWV (at –1650 mV) on DNT concentration when using an unfunctionalized 3DOM carbon electrode in benzotrifluoride/100 mM $NBu_4BArF_{24}$. *T* = 20 °C, SW pulse length = 500 ms, SW amplitude = 101 mV, potential step = 5 mV.

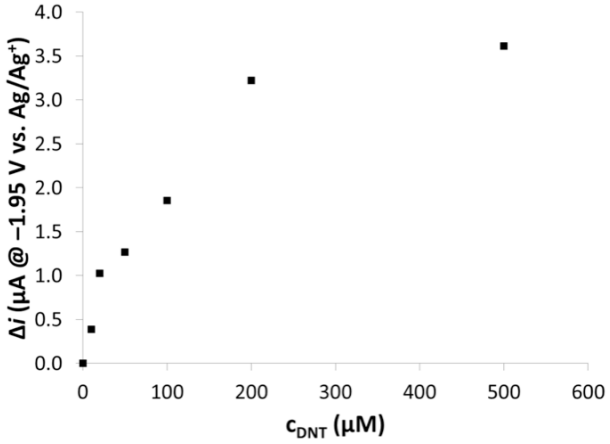


**Figure S4.** Dependence of the corrected current observed by SWV (at –1950 mV) on DNT concentration using a functionalized 3DOM carbon electrode in benzotrifluoride/100 mM $NBu_4BArF_{24}$, with 1.0 mM nitrobenzene added. Data is corrected by subtraction of the current observed at –1.95 V for a solution of 1 mM nitrobenzene in the absence of DNT. *T* = 20 °C, SW pulse length = 500 ms, SW amplitude = 101 mV, potential step = 5 mV.