

Electronic Supplementary Information

Plasma-treated carbon-fiber microelectrodes for improved purine detection with fast-scan cyclic voltammetry

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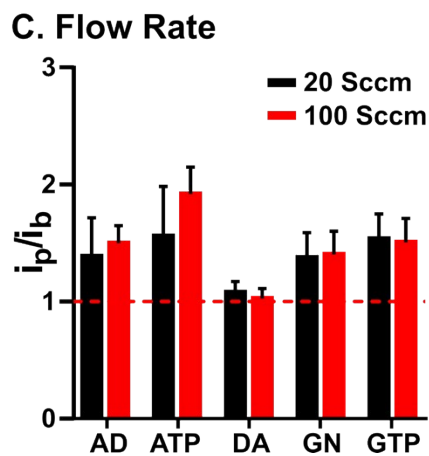
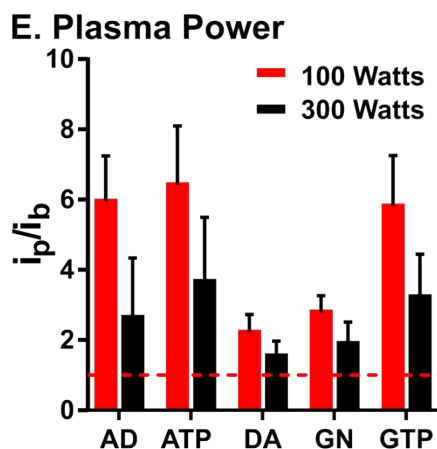
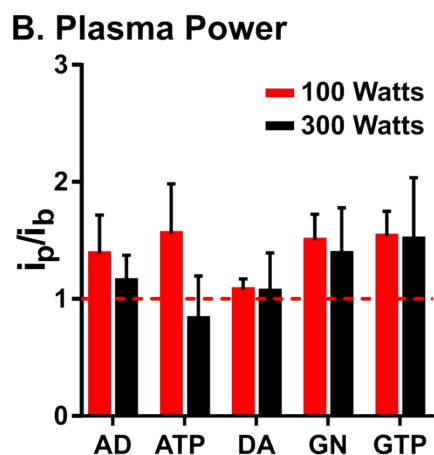
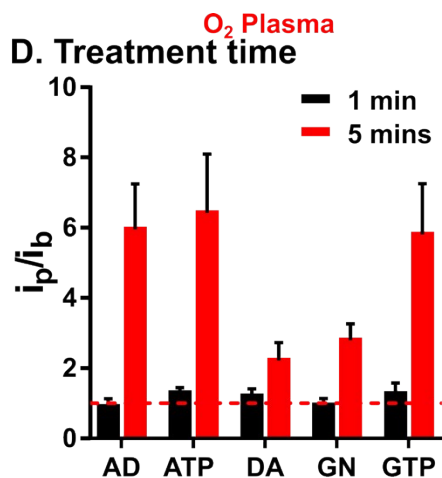
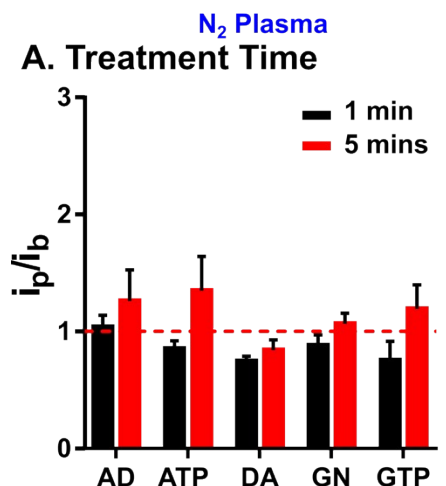


Figure S-1: Plasma parameters were optimized for N₂ (A-C) and O₂ (D-E) plasma. (A) At constant flow rate and power (20 sccm, 50 Watts), treatment time was tested for N₂ plasma. The optimal treatment time was chosen as 5 min. (B) At the optimal treatment time (5 min) and a constant flow rate (20 sccm), two additional powers were tested (100 W and 300 W). 300 W power was too high (visibly damaged some electrodes) and the electrodes were hot to touch after treatment therefore, 100 W was chosen as optimal. (C) At the optimized power (100 W) and treatment time (5 min), the flow rate was tested (20 and 100 sccm) for N₂ plasma. Flow rate didn't significantly impact the plasma treatment. A 100 sccm flow rate was used for all proceeding N₂ and O₂ plasma treatments. (D) At 100 W and 100 sccm, the treatment time was varied (1 and 5 min). Just like N₂ plasma, 5 min was optimal. (E) Likewise, the optimal time (5 min) and flow rate (100 sccm) were held constant and power was varied from 100 to 300 W. Just like N₂ plasma, 300 W was too high. (n = 4-12)

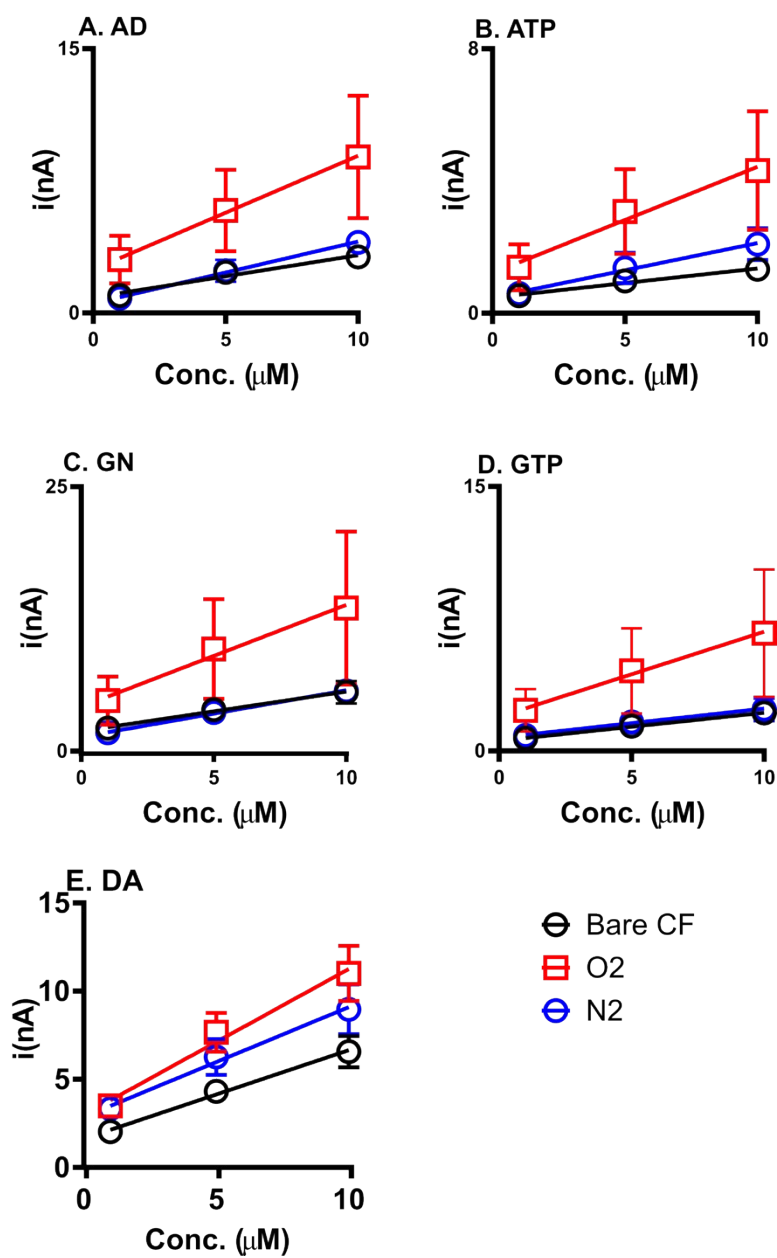


Figure S-2: Both O_2 and N_2 plasma treatment changes the sensitivity of the electrode for purines and dopamine. Sensitivity for (A) AD, (B) ATP, (C) GN, (D) GTP, and (E) DA at the bare carbon fiber (CF, black), O_2 plasma (red), and N_2 plasma (blue) treated electrodes. Concentrations tested ranged from 1 μM to 10 μM . ($n = 4-5$)

Table S-1. Plasma affects the surface coverage, adsorption strength, and sensitivity (n =

Analyte	Surface Coverage (Γ , pmol/cm ²)			Adsorption Strength (b, cm)			Sensitivity (nA/ μ M)		
	Bare	O ₂	N ₂	Bare	O ₂	N ₂	Bare	O ₂	N ₂
AD	12.9 ± 2.5	20.1 ± 4.6	19.2 ± 5.2	0.09 ± 0.001	0.24 ± 0.01	0.13 ± 0.004	0.24	0.64	0.35
ATP	14.4 ± 7.8	22.2 ± 8.1	19.5 ± 12.3	0.04 ± 0.001	0.15 ± 0.005	0.05 ± 0.001	0.09	0.32	0.16
GN	38.1 ± 8.1	62.9 ± 23	60 ± 20	0.17 ± 0.003	0.54 ± 0.10	0.22 ± 0.002	0.37	0.96	0.44
GTP	16.3 ± 3.6	26.9 ± 6.9	22.7 ± 6	0.09 ± 0.002	0.27 ± 0.01	0.09 ± 0.002	0.16	0.48	0.17
DA	138 ± 22	227 ± 34.2	179 ± 37	0.84 ± 0.002	1.27 ± 0.003	1.04 ± 0.004	0.50	0.83	0.62

4-5)

Analyte	Equilibrium Constant β ($\times 10^{-2} \text{cm}^3/\text{pmol}$)		
	Bare CF	O ₂ Plasma	N ₂ Plasma
AD	0.42	1.80	0.68
ATP	0.18	0.61	0.35
GN	0.67	1.16	0.38
GTP	0.52	1.78	0.44
DA	0.63	0.83	0.90

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