

Supporting information

Reagent-free phosphate chemiresistive sensor using carbon nanotube functionalized with crystal violet

Vinay Patel¹, Md Ali Akbar², Peter Kruse², and P. Ravi Selvaganapathy^{1,3*}

¹ School of Biomedical Engineering, McMaster University, Hamilton, ON, L8S 4K1, Canada

² Department of Chemistry and Chemical Biology, McMaster University, Hamilton, ON, L8S 4M1, Canada

³ Department of Mechanical Engineering, McMaster University, Hamilton, ON, L8S 4K1, Canada

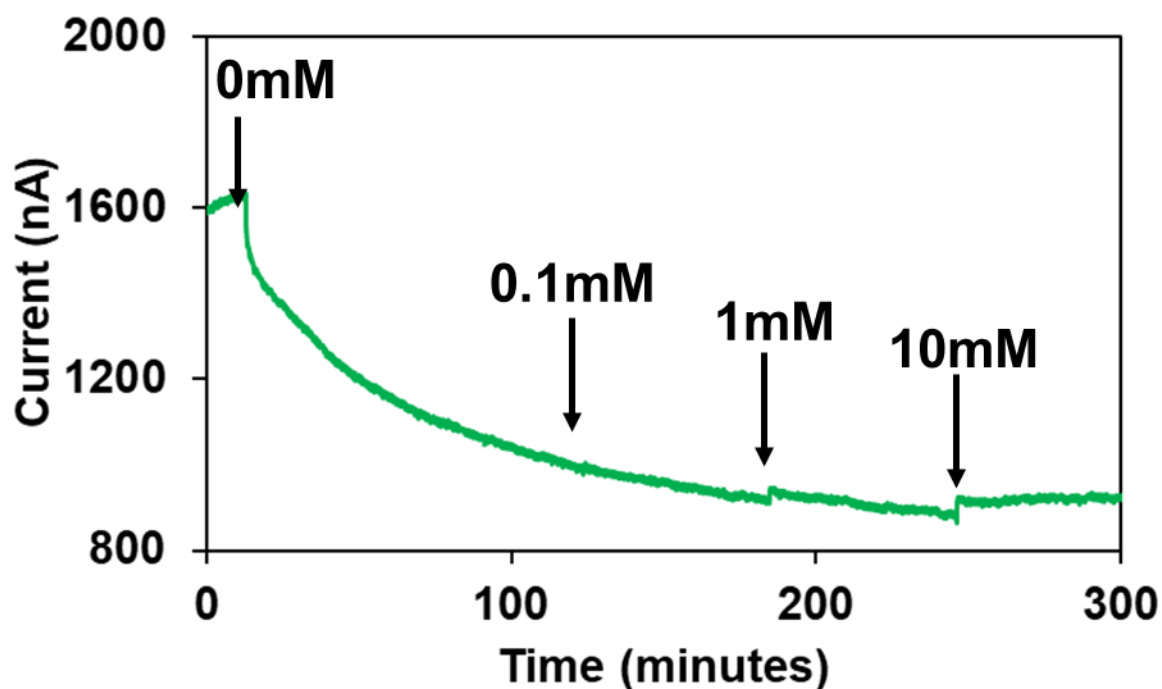


Figure S1 Sensor response for pristine SWCNT for three KH_2PO_4 concentration including 0.1 mM, 1 mM and 10 mM.

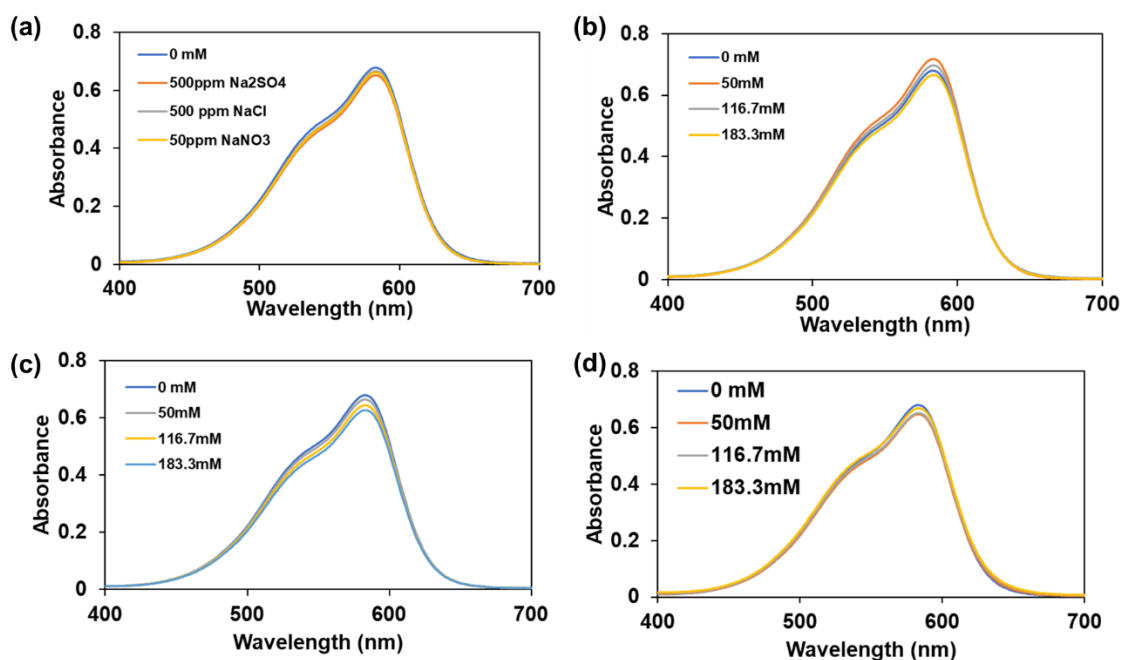


Figure S2 UV-Vis spectrum (a) Crystal violet solution (18 μM) exposed 500 ppm of NaCl, 50 ppm of NaNO_3 and 500 ppm of Na_2SO_4 , respectively, (b) Crystal violet solution (18 μM) in presence of three Na_2SO_4 concentrations (50 mM, 116.7 mM and 183.3 mM), (c) Crystal violet solution (18 μM) in presence of three NaCl concentrations (50 mM, 116.7 mM and 183.3 mM), and (d) Crystal violet solution (18 μM) in presence of three NaNO_3 concentrations (50 mM, 116.7 mM and 183.3 mM).

Table S1 Summary of t-test performed for sensor response at pH 6 and pH 10.

pH	Phosphate conc. (mM)	Mean	Variance	p-value	t-critical (2 tail)	t-stat
pH 6	0.1	0.69%	0.01%			
	1	0.67%	0.01%	0.98	2.78	0.02
	10	1.14%	0.02%	0.98	2.78	-0.48
pH 10	0.1	1.54%	0.01%			
	1	1.48%	0.02%	0.94	3.18	0.08
	10	3.57%	0.03%	0.17	2.78	-1.67

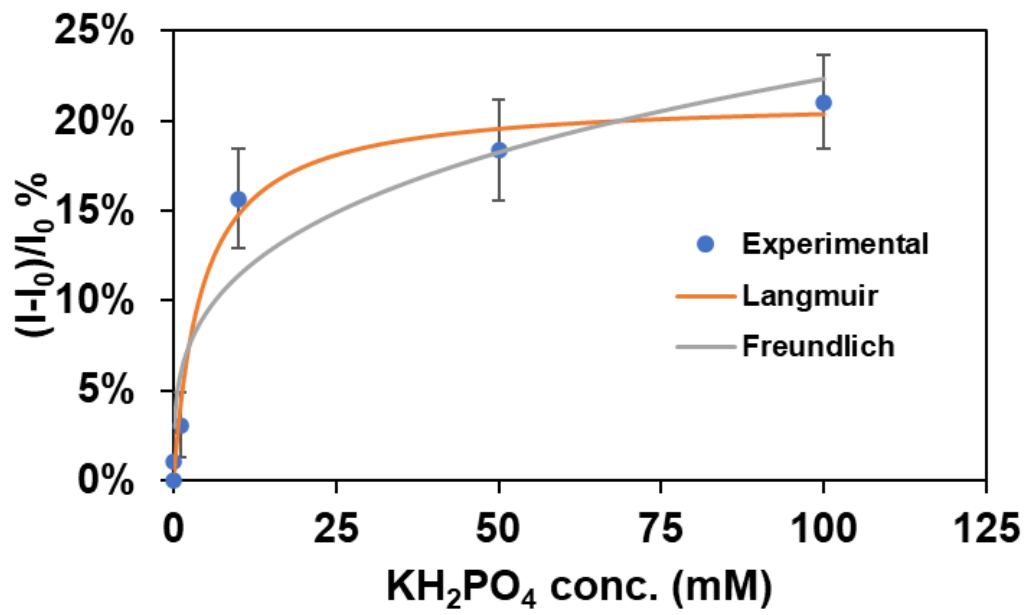


Figure S3 Sensor response for five different KH_2PO_4 concentrations (0.1 mM, 1 mM, 10 mM, 50 mM and 100 mM). The response was fitted to Langmuir and Freundlich adsorption isotherms.

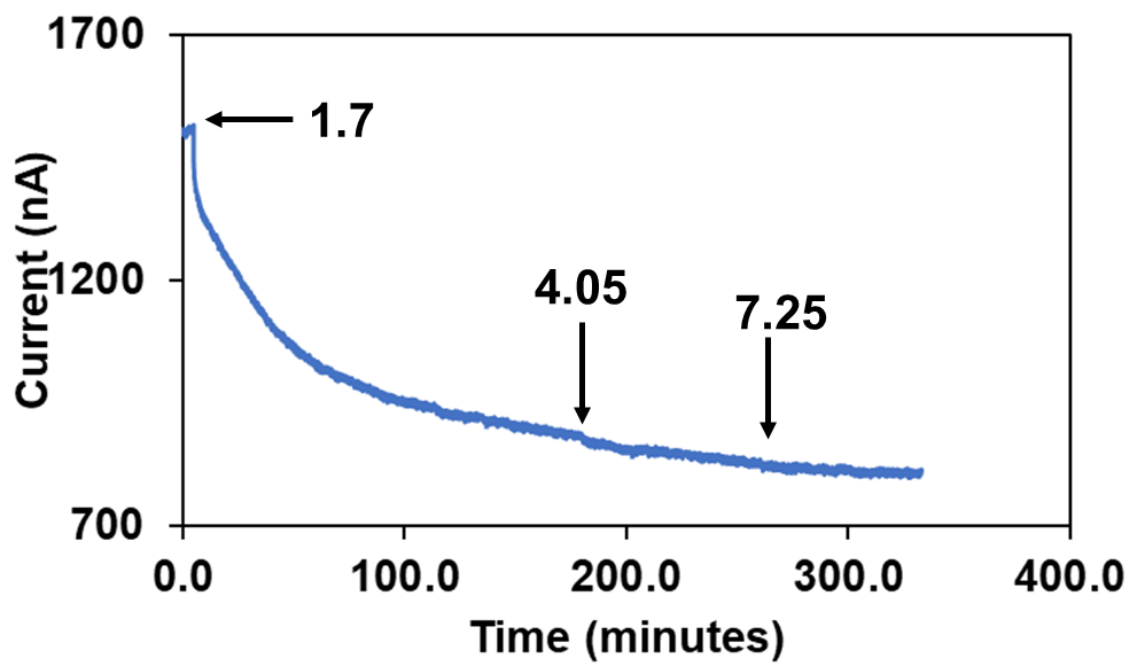


Figure S4 Sensor response for pristine SWCNT for three conductivity solutions (1.7, 4.05 and 7.25 mS/cm).

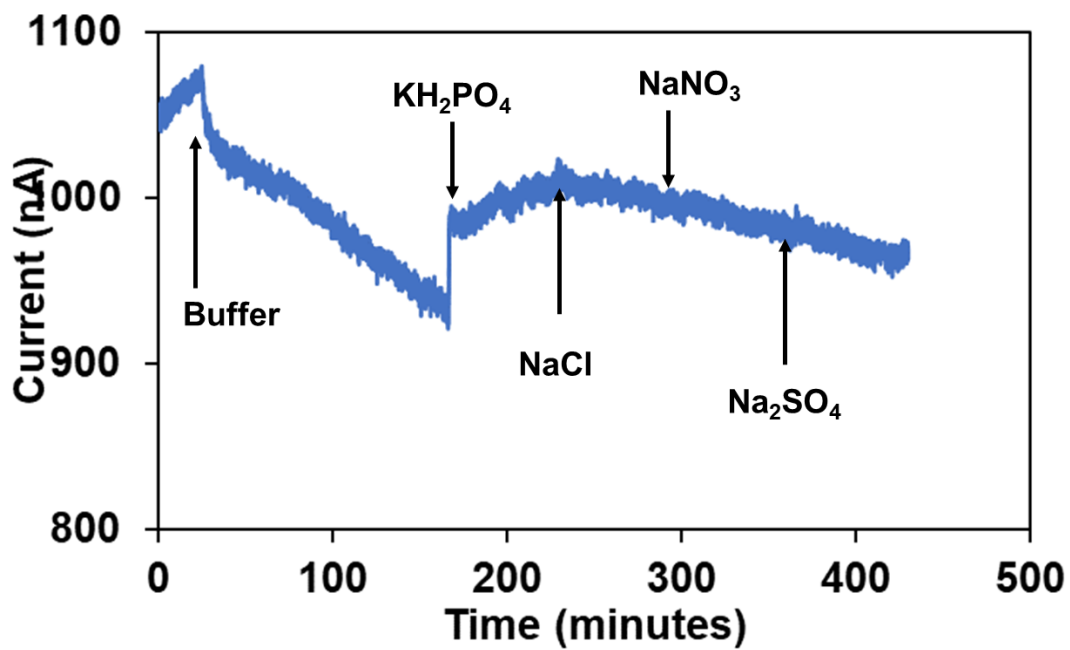


Figure S5 Sensor response for pristine SWCNT for 10mM H₂PO₄⁻, 500 ppm of NaCl, 50 ppm of NaNO₃ and 500 ppm of Na₂SO₄.

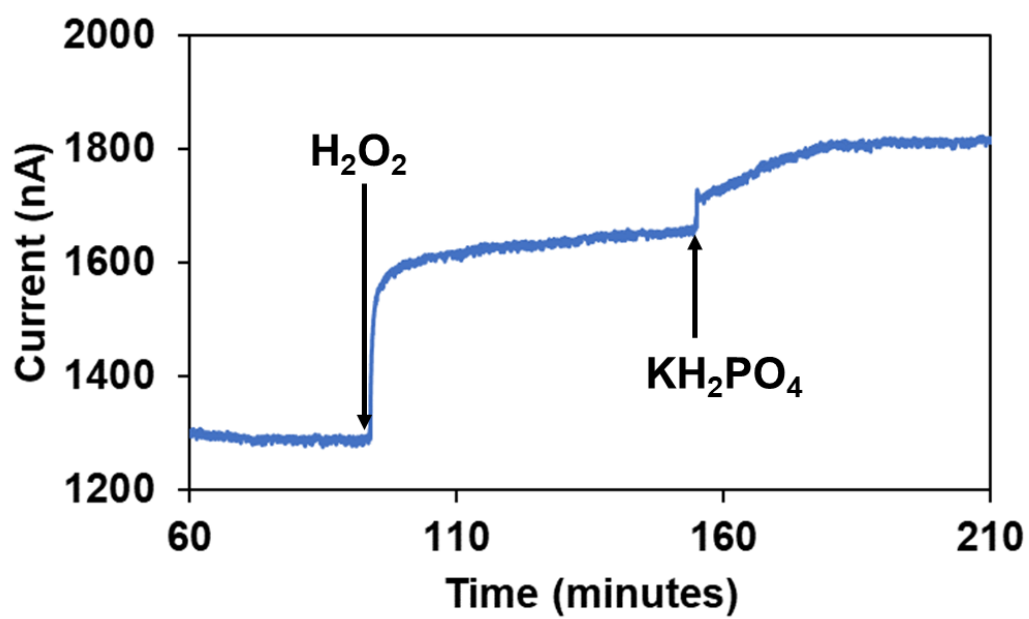


Figure S6 Sensor exposed to H_2O_2 (400 ppm) followed by 10 mM KH_2PO_4