

Single Walled Carbon Nanotube Sensor Platform for the Study of Extracellular Analytes

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SUPPORTING INFORMATION

Table s1: Atomic percent values are for each derivatization step necessary to produce avidin derivatized substrates. Carbon percentage increases with each step in the derivatization process indicating the presence of 3-GPTMS and avidin. Significant levels of nitrogen are not observed until avidin derivatization. Interestingly, silicon content increases upon 3-GPTMS functionalization presumably due to the Si atom present in 3-GPTMS. Oxygen content decreases following each step of derivatization in accordance with shielding effects.

Derivatization Step	Atomic Percent			
	C1s	N1s	Si2p	O1s
Piranha	8.95	0.68	26.91	63.46
Epoxy Silane	16.75	0.67	57.07	25.5
Avidin	54.14	12.93	26.27	6.66

Table s2: Atomic percent values are tabulated for every derivatization step. Carbon percentage is seen to increase with the addition of APTES. Nitrogen does not make up a significant percentage until APTES derivatization reinforcing its presence on the surface. Oxygen content decreases following APTES derivatization in good accordance with shielding effects

Derivatization Step	Atomic Percent			
	C1s	N1s	Si2p	O1s
Piranha	8.95	0.68	26.91	63.46
APTES	15.77	2.98	25.74	55.51

	Biotinylated SWNT	Non-Biotinylated SWNT
Sample 1	33.58	31.55
Sample 2	33.42	31.16
Sample 3	32.25	32.40
Average	33.08	31.70
Standard Error	0.42	0.37

Table s3: Full width half max values, displayed graphically in Figure 2, are provided.

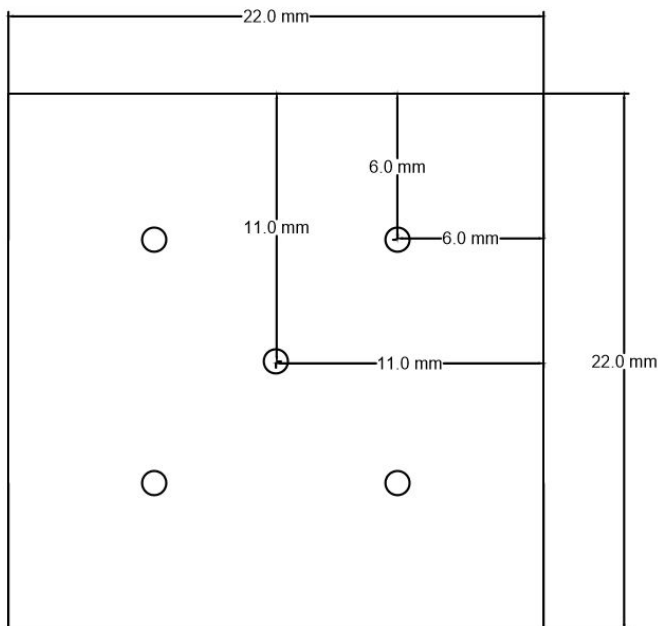


Figure s1: A 22 X 22 mm section of glass slide was used. The figure demonstrates the locations imaged in the treated area where circles are the locations imaged. 5 subsamples per slide were always taken. Samples were moved in slightly from the edges to prevent edge effects from skewing results.



Figure s2: Glass slides were used as the base of the avidin and APTES treated slides. They had a contact angle of $<5^\circ$. The contact angle after each treatment step is shown in Figures 3 and s3.

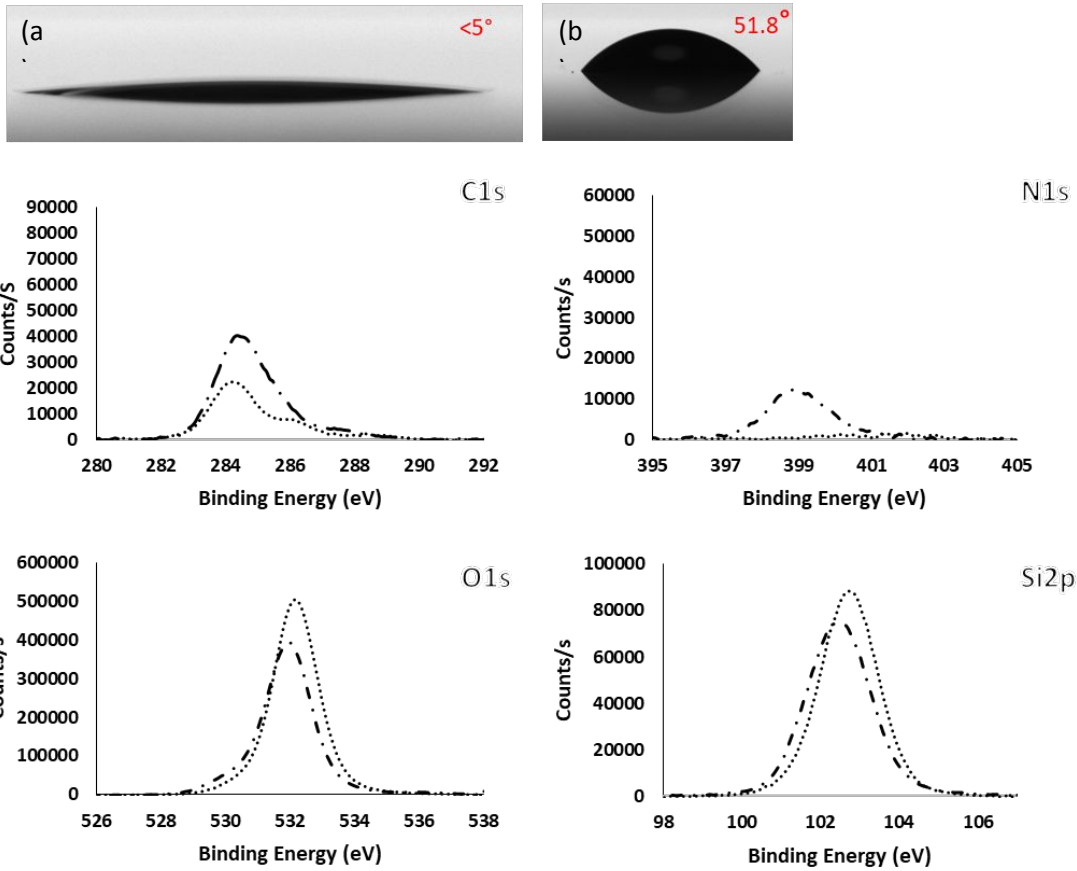


Figure s3: Generating APTES derivatized substrates (a) Piranha treated slides, demonstrated a contact angle of $<5^\circ$ which is consistent with glass substrates treated in this manner. (b) APTES treated slides, show a characteristic increase in contact angle of 51.8° . (XPS peaks) the C1s peak clearly demonstrates an increase in the total carbon content after APTES functionalization which can be attributed to the arm of the silane. The N1s peak showed no substantial peaks until APTES functionalization which can be attributed to the aminopropyl head of APTES. Both the O1s and Si2p peaks demonstrate shielding effects as the addition of the silane reduces the signal intensity from the underlying SiO_2 framework.

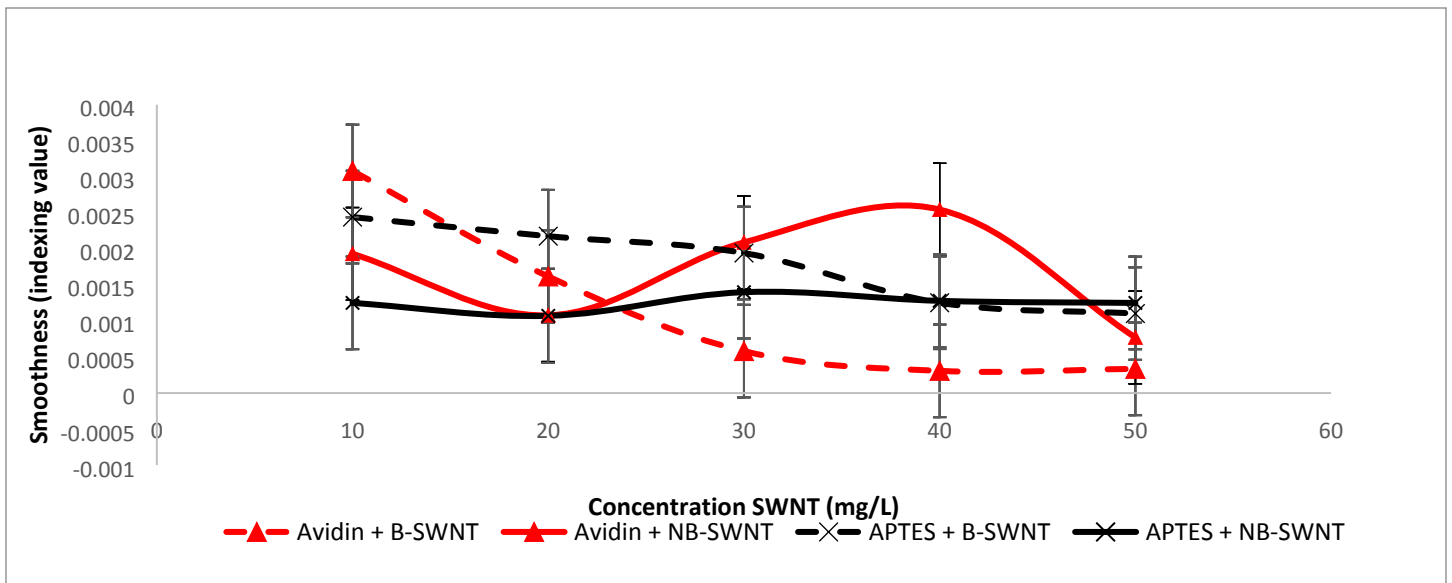


Figure s4: Another method of determining smoothness is to process the image with 1-level of 2D discrete wavelet decomposition; and then use the percent energy of the pixels being partitioned into the diagonal wavelet component as the index to assess randomness. Using this method, no significant differences in overall smoothness could be determine.