Supporting information

Table S1 Fitting parameters over time of the equivalent circuit 2 RC Model (inset Figure S1) for devices degraded under dark and N_2 environment.

Time (h)	L (H)	R_1 (Ohm)	R_2 (Ohm)	R_3 (Ohm)	C_1 nF	C_2 nF
0 h	3.22×10^{-7}	12.33	260.90	45.58	10.64	7.14
504	3.22×10^{-7}	12.33	265.50	48.71	14.57	9.70
2397	3.22×10^{-7}	12.66	275.50	53.71	20.73	10.67
2568	3.22×10^{-7}	12.66	297.50	54.74	21.94	11.17
2712	3.22×10^{-7}	12.66	392.00	56.95	22.37	11.20
3196	3.22×10^{-7}	13.33	446.00	57.95	23.38	11.40
3240	3.22×10^{-7}	13.33	465.80	59.95	26.60	11.56
3432	3.22×10^{-7}	14.17	465.80	62.56	24.12	11.73
3552	3.22×10^{-7}	14.17	475.60	76.55	24.23	11.91

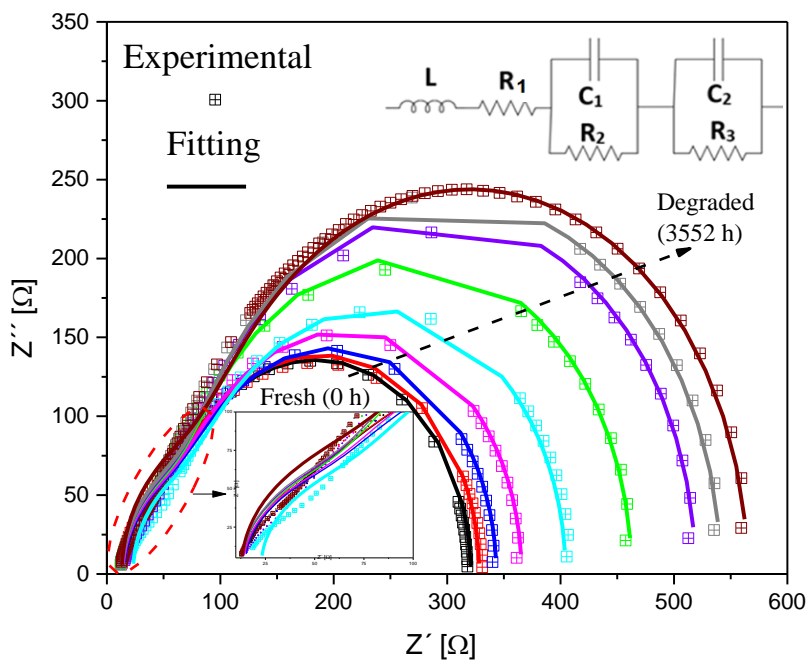**Figure S1.** Cole-Cole plot at open circuit condition, V_{bias}= 0.78 V, with frequency range of 1 kHz-2 MHz under dark and an oscillation amplitude of 50 mV. The fits were done using the 2 RC model. It is seen that the adjustment at high frequencies is not good.
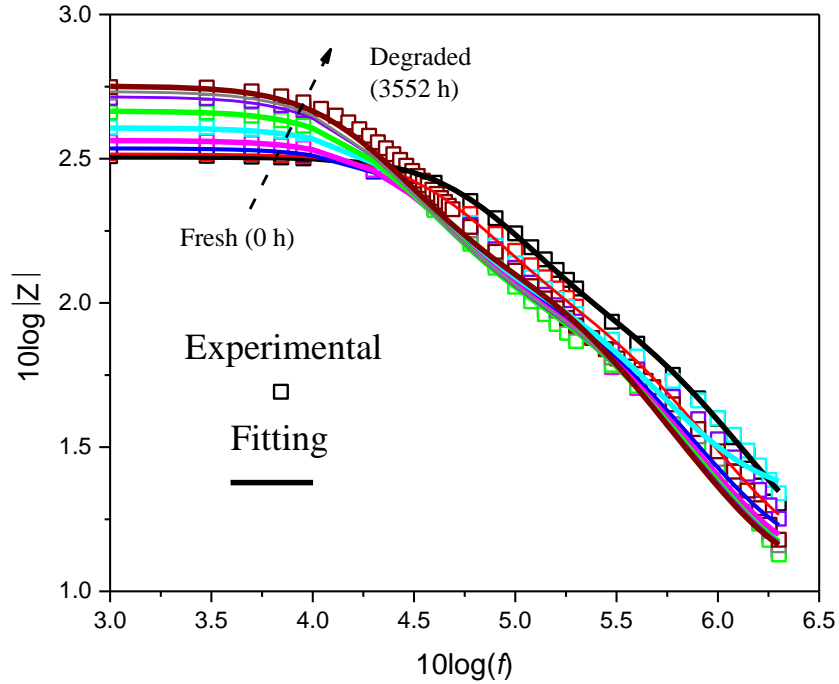
Figure S2. The magnitude Bode plot: experimental (symbols) and fitted (lines) values for the measurements over time of the fabricated devices using the 2 RC model. It is seen that the adjustment at high frequencies is not good.
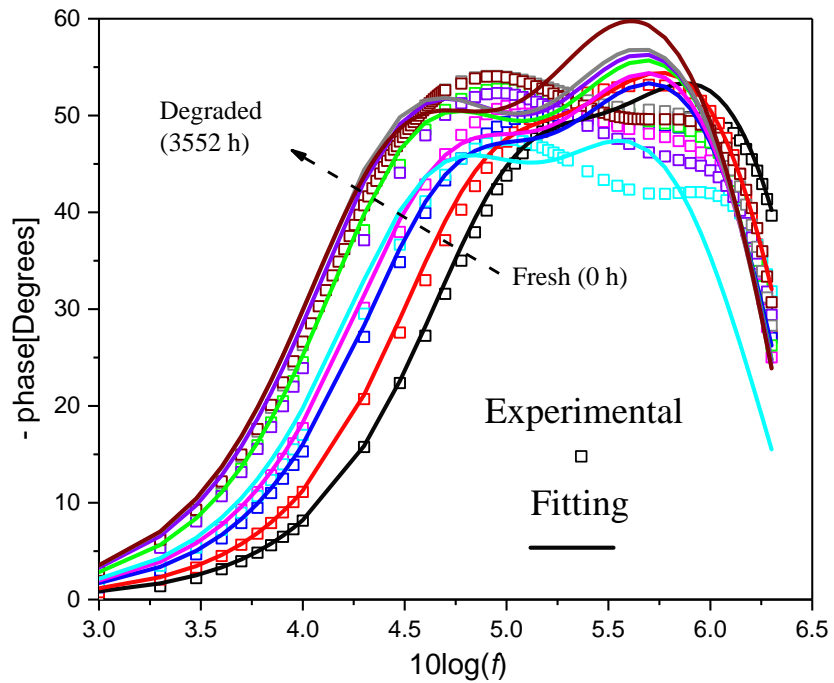

Figure S3. The phase Bode plot: experimental (symbols) and fitted (lines) values for the measurements over time of the fabricated devices using the 2 RC model. It is seen that the adjustment at high frequencies is not good.

Table S2 Fitting parameters over time of the equivalent circuit 3 R-C Model (inset Figure S4) for devices degraded under dark and N_2 environment.

Time (h)	L (H)	R_1 (Ohm)	R_2 (Ohm)	R_3 (Ohm)	R_4 (Ohm)	C_1 (F)	C_2 (F)	C_3 (F)
0 h	3.1×10^{-7}	10.84	250.70	33.40	20.23	11.44	6.55	59.00
504	3.1×10^{-7}	10.84	262.00	35.42	21.41	13.49	6.97	58.22
2397	3.1×10^{-7}	10.84	276.30	35.81	21.79	18.33	6.99	55.94
2568	3.1×10^{-7}	10.97	291.90	36.51	28.26	20.38	7.19	54.00
2712	3.1×10^{-7}	11.25	322.00	37.34	28.51	20.85	7.22	53.42
3196	3.1×10^{-7}	11.45	377.60	37.40	39.60	22.78	7.24	51.74
3240	3.1×10^{-7}	11.75	406.00	40.97	57.10	22.81	7.58	49.36
3432	3.1×10^{-7}	11.95	432.70	41.54	62.36	22.98	7.95	48.58
3552	3.1×10^{-7}	13.72	443.40	41.60	68.91	22.98	7.97	47.20

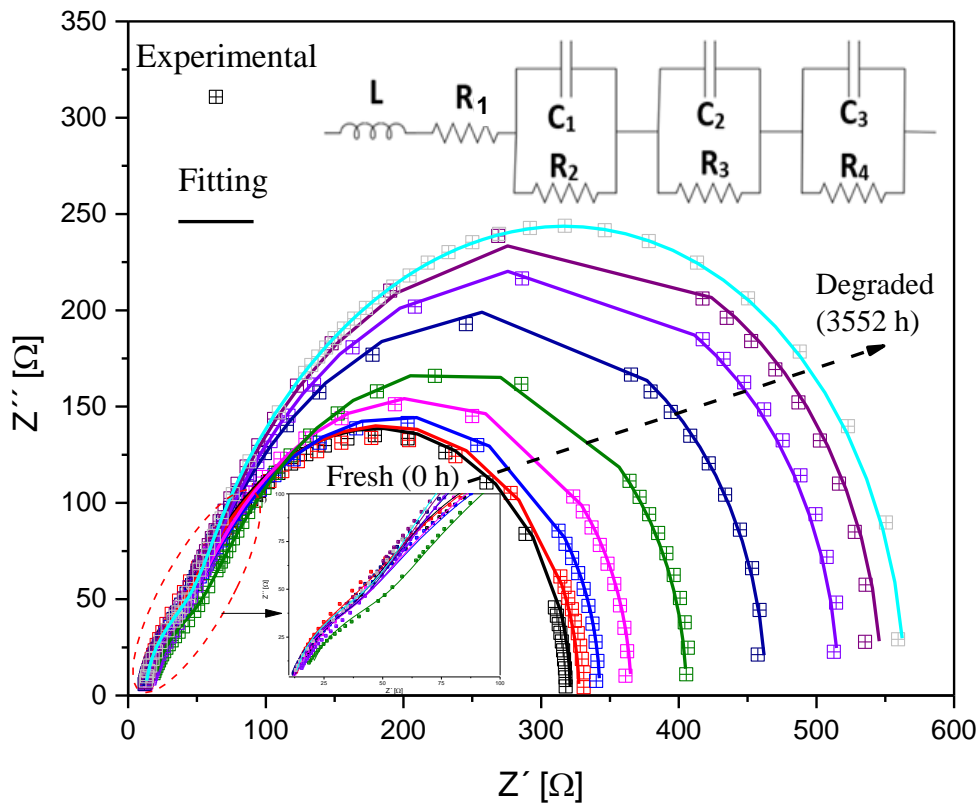**Figure S4.** Cole-Cole plot (experimental-symbols and fitted-lines) over time at open circuit condition, Vbias= 0.78 V, frequency range of 1 kHz-2 MHz degraded under dark and N_2 environment and an oscillation amplitude of 50 mV. The fits were done using the 3 RC model. The fitting is good for all the frequency range.
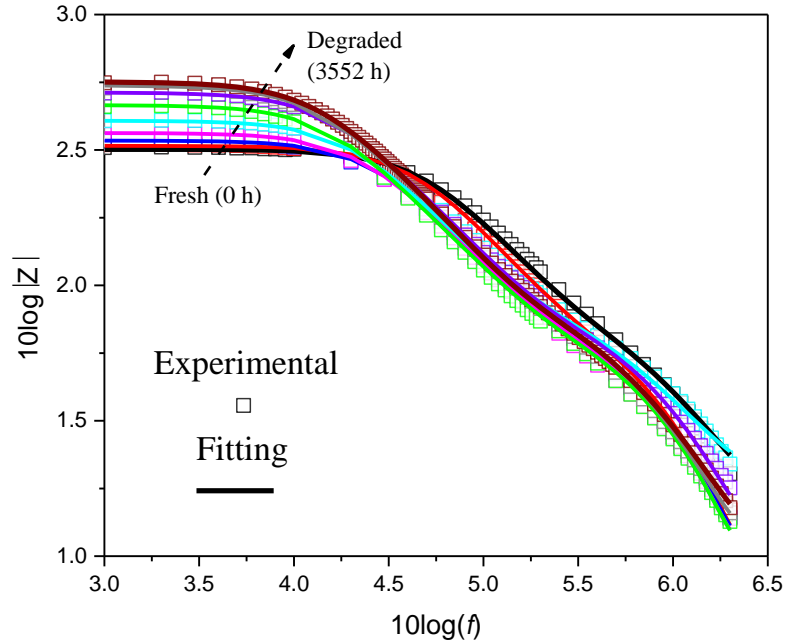
Figure S5. The magnitude Bode plot: experimental (symbols) and fitted (lines) values for the measurements over time of the fabricated devices using the 3 RC model. The fitting is good for all the frequency range.
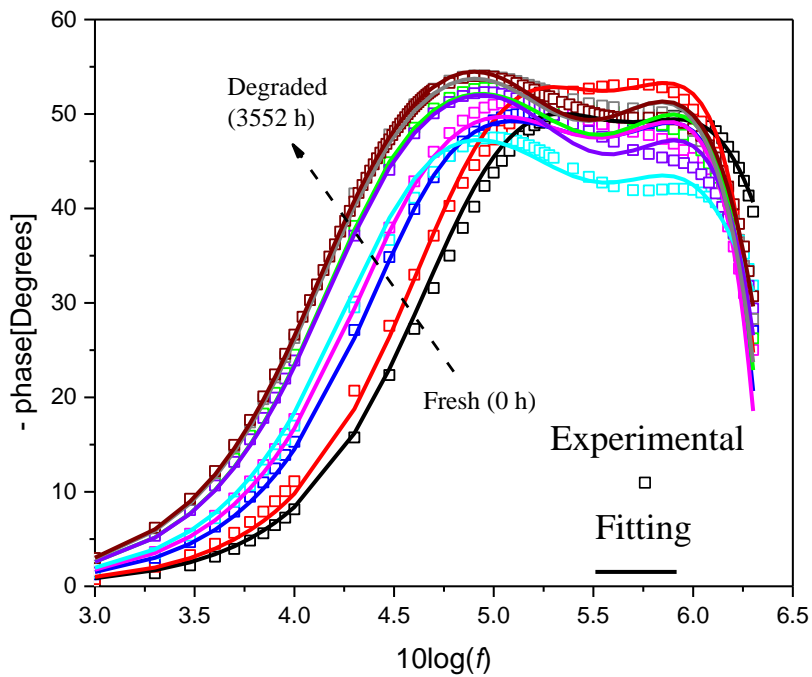

Figure S6 The phase Bode plot: experimental (symbols) and fitted (lines) values for the measurements over time of the fabricated devices using the 3 RC model. The fitting is good for all the frequency range.