SUPPORTING INFORMATION

Optimization of inkjet-printed PEDOT:PSS electrodes on plasma-modified PDMS composites

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Description of Surface Energy estimation

An insight into the interactions between liquid and solid surfaces is possible through the Owens and Wendt geometric mean approach [Owens, D. K.; Wendt, R. C. Estimation of the surface free energy of polymers. J. Appl. Polym. Sci. 1969, 13, 1741-1747]. These authors developed the idea that both the solid superficial energy (defined both as σ or σ_s) and the liquid surface tension (defined both as γ or σ_l) can be separated into two terms: i) a polar contribution, due to Coulomb interactions between permanent or induced dipoles; ii) a dispersive contribution, due to van der Waals forces, as described by:

$\sigma_l = \sigma_l^d + \sigma_l^p$ and $\sigma_s = \sigma_s^d + \sigma_s^p$ **eqn (1)**

where σ_l^d and σ_l^p represent the dispersive and polar parts of the liquid, while σ_s^d and σ_s^p stand for the respective dispersive and polar contributions of the solid. The interfacial energy from the contributions of the liquid and solid ($\sigma_{s,l}$) is given by :

$\sigma_{s,l} = \sigma_s + \sigma_l - 2\,[\sqrt{(\sigma_{s^d}\sigma_{l^d})} + \sqrt{(\sigma_{s^p}\sigma_{l^p})}]$ **eqn (2)**

Taking into account Young's formula (coming from the equilibrium of the forces at the edge of a drop on a solid surface):

$\sigma_s = \sigma_{l,s} + \sigma_l \cos\theta$ **eqn(3)**

an equation in the following form is obtained:

$y = a\,x + b$, with $y = \frac{1+\cos\theta}{2} \bullet \frac{\sigma_l}{\sqrt{\sigma_{l^d}}}$, $x = \sqrt{\sigma_{l^p}/\sigma_{l^d}}$, $a = \sqrt{\sigma_{s^p}}$ and $b = \sqrt{\sigma_{s^d}}$ **eqn (4)**

It should be noticed that both entities *x* and *y* depend only on the liquid, while the entities *a* and *b* depend on the solid. Considering a series of different liquids, plotting *y* versus *x* allows calculating σ_s^p from the slope of the fitted line and σ_s^d from the intersection with *y* axis.

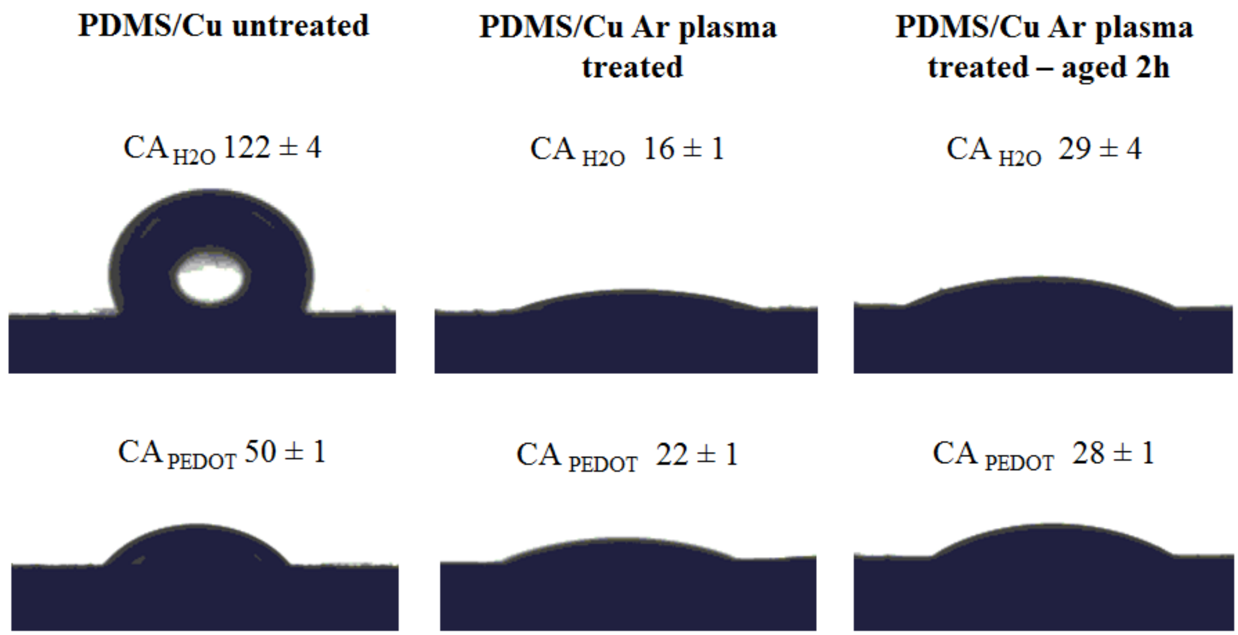

Figure S1: Comparison of water and PEDOT:PSS Contact Angles on untreated, APP-freshly-treated and 2h aged Cu-PDMS substrates.

Table S2 containing all experimental data:

Table S2 part A Sample experimental data: APP parameters, IjP parameters, IA statistical parameters.

APP power (J s^{-2})	APP # passes	Time elapsed since treatment (min)	APP hardness (J)	IjP # passes	Printing density (dpi)
0	0	1	0	3	157.48
0	0	1	0	5	157.48
0	0	1	0	10	157.48
400	3	735	1.632653061	1	78.74
400	3	737	1.628222524	1	157.48
400	3	742	1.617250674	1	314.96
550	4	720	3.055555556	1	78.74
550	4	722	3.047091413	1	157.48

550	4	727	3.026134801	1	314.96
1100	5	60	91.66666667	1	78.74
1100	5	62	88.70967742	1	157.48
1100	5	65	84.61538462	1	236.22
1100	5	69	79.71014493	1	314.96
1100	5	75	73.33333333	2	59.055
1100	5	77	71.42857143	2	78.740
1100	5	79	69.62025316	2	157.480
1100	5	140	39.28571429	1	78.740
1100	5	142	38.73239437	1	157.480
1100	5	145	37.93103448	1	236.220
1100	5	149	36.91275168	1	314.960

Table S2 part B (continued) Sample experimental data: APP parameters, IjP parameters, IA statistical parameters.

Engineering volume (in^{-1})	Fill factor	IA Peak #1 width (px)	IA Peak #1 height (-)	IA Peak #2 width (px)	IA Peak #2 height (-)
472.44	0.268837	N/A	N/A	N/A	N/A
787.4	0.485287	N/A	N/A	N/A	N/A
1574.8	0.577513	N/A	N/A	N/A	N/A
78.74	1.000000	1.02922	0.51501	N/A	N/A
157.48	1.000000	23.09119	0.14565	N/A	N/A
314.96	1.000000	73.68934	0.15750	N/A	N/A
78.74	1.000000	22.11744	0.11846	N/A	N/A
157.48	1.000000	6.56777	0.10247	N/A	N/A

314.96	1.000000	15.22623	0.09958	5.37597	0.66963
78.74	1.000000	2.60774	0.19554	2.62196	0.15238
157.48	1.000000	28.94776	0.08152	N/A	N/A
236.22	1.000000	5.03222	0.75280	N/A	N/A
314.96	1.000000	48.47230	0.33863	N/A	N/A
118.11	1.000000	11.89332	0.05854	N/A	N/A
157.48	1.000000	6.65318	0.12446	99.71703	0.92144
314.96	1.000000	7.36850	0.09738	5.71885	0.11907
78.74	1.000000	8.21996	0.39893	N/A	N/A
157.48	1.000000	0.53899	0.33977	3.56253	0.23941
236.22	1.000000	4.75590	0.20900	7.83212	0.10216
314.96	1.000000	2.96163	0.13138	6.18320	0.09578

Table S2 part C (continued) Sample experimental data: APP parameters, IjP parameters, IA statistical parameters.

Fit R^2	IA Peak #1 broadness	IA Peak #2 broadness
N/A	N/A	N/A
N/A	N/A	N/A
N/A	N/A	N/A
0.73255	1.99845	N/A
0.85412	158.53889	N/A
0.60800	467.86883	N/A
0.69580	186.70809	N/A
0.47281	64.09456	N/A
0.79416	152.90450	8.028269343
0.88123	13.33609	17.20672004

0.53308	355.10010	N/A
0.57376	6.68467	N/A
0.43611	143.14237	N/A
0.49883	203.16570	N/A
0.64124	53.45637	108.2186903
0.74956	75.66749	48.02931049
0.97989	20.60502	N/A
0.94397	1.58634	14.88045612
0.92472	22.75550	76.66523101
0.86606	22.54247	64.5562748