Composition analysis of two different PEDOT:PSS commercial products used as an interface layer in Au/*n*-Si Schottky diode

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^{\$}Supporting Information

According to Cheung model current–voltage characteristics due to TE theory of SBDs can be expressed as:

$$\frac{dV}{d(lnI)} = IR_S + \frac{nkT}{q} \tag{1}$$

Figure S1 [(a) and (b)] shows the dV/d(lnI) vs. *I* curves at temperatures range 290 K to 380 K. This plot follows a linear behavior where its slope gives the series resistance (R_s) and intercept gives the ideality factor (*n*). The value of R_s and *n* are obtained from the plot. Using the calculated ideality factor, the effective barrier heights are evaluated by another equation of Cheung, defined as:

$$H(I) = V - n\frac{kT}{q}ln\left(\frac{I}{AA^*T^2}\right) = n\phi_{b0} + R_S I$$
⁽²⁾

Figure S1 [(c) and (d)] shows a plot of H(I) vs. I at temperatures same range. Again this plot also follows a straight line with intercept equal to $n\phi_{b0}$. The calculated values of n, ϕ_{b0} and R_s are shown in table 1.



Figure S1: Temperature dependent plot of dV/d(lnI) vs. *I* and H(I) vs. *I* for Au/PH1000/*n*-Si and Au/HTL Solar/*n*-Si SBDs.

Table 1: Temperature dependent electrical parameters of Au/PH1000/n-Si and Au/HTL Solar/n-Si SBDs determined from I-V-T characteristics.

T(K)	Au/PH1000/ <i>n</i> -Si					Au/HTL Solar/ <i>n</i> -Si				
	TE Theory		Cheung Equation			TE Theory		Cheung Equation		
	п	φ	п	φ	R_s	п	φ	N	φ	R_s
290	4.63	0.680	3.92	0.818	34.05	3.25	0.692	3.01	0.877	12.96
300	4.08	0.701	3.81	0.848	21.08	3.12	0.713	2.89	0.899	11.75
310	3.66	0.723	3.78	0.867	15.14	2.99	0.729	2.58	0.926	11.11
320	3.32	0.744	3.11	0.905	14.01	2.83	0.747	2.43	0.944	10.01
330	3.1	0.763	2.56	0.957	12.15	2.78	0.778	2.21	0.980	9.35
340	2.96	0.778	2.45	0.973	10.27	2.68	0.775	2.00	0.986	8.92
350	2.84	0.795	2.35	0.982	9.39	2.55	0.792	1.84	1.008	8.44
360	2.69	0.813	2.12	1.002	9.11	2.49	0.805	1.68	1.026	8.02
370	2.62	0.839	1.85	1.041	9.41	2.38	0.833	1.58	1.044	7.48
380	2.73	0.835	1.77	1.048	8.87	2.36	0.834	1.43	1.062	7.37



Figure S2: Richardson plots of the $ln(I_0/T^2)$ vs. 1000/T for Au/PH1000/*n*-Si and Au/HTL Solar/*n*-Si SBDs at the temperature range from 290 K to 380 K.



Figure S3: $\phi_{apvs.1000/T}$ plot of Au/PH1000/*n*-Si and Au/HTL Solar/*n*-Si SBDs.