Electronic Supplementary Material (ESI) for RSC Advances.

Supporting information for:

A simple technique for performing evaporation of quaterthiophene below the melting temperature for vapour phase polymerisation and physical vapour deposition

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Optical absorbance of QTh

The optical absorbance of QTh in the solid state can be seen in figure S1 below. The absorbance differs to that which can be seen for the liquid state in [S1]. The π-π* peak occurs at ~340nm. In the liquid state it has been shown to occur at ~390nm.

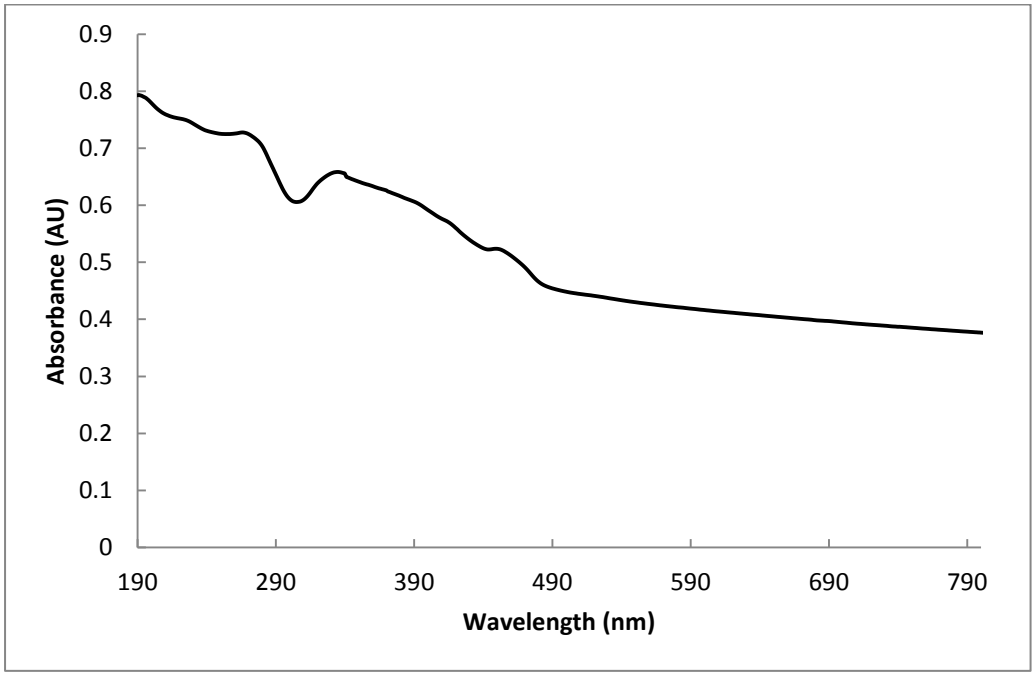

Figure S1 – The optical absorbance of quaterthiophene drop cast from chloroform

Figure S2 shows the optical absorbance of decomposing PEGC depositing on the oxidant coated glass slide and the same QTh optical absorbance shown in Figure 1 of the main article. This demonstrates that the PEGC is decomposing and depositing on the oxidant, however the peaks at 200nm and 225 nm correspond to the QTh that was deposited.

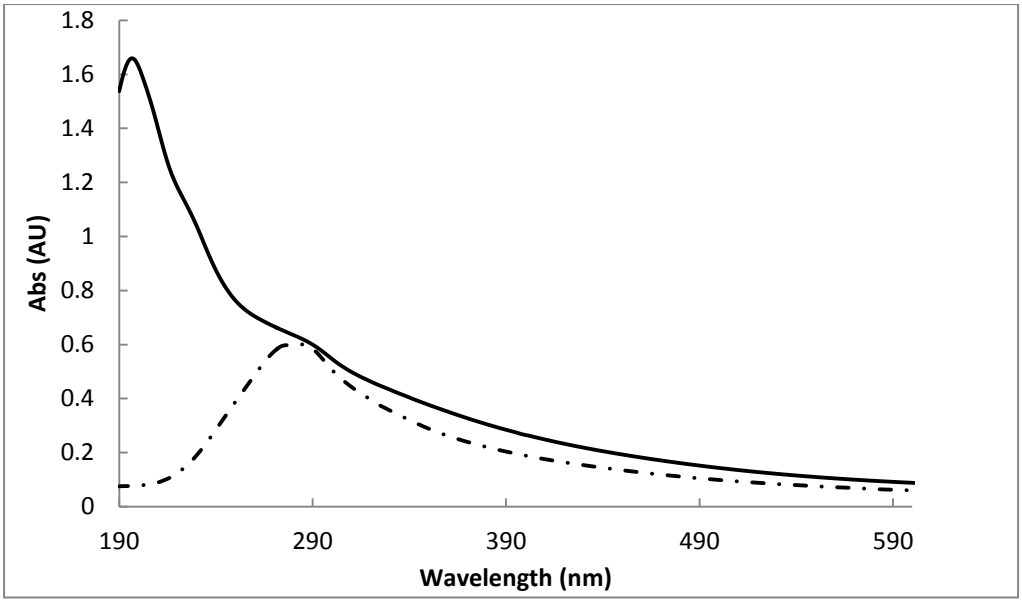

Figure S2 – The optical absorbance of VD QTh (solid line) from the QTh +PEGC precursor and VD PEGC (without QTh) (dotted line)

XPS results of QTh

Figure S3 shows the sulphur peaks from the XPS measurements (S2P orbital) of PVD QTh and PVD QTh from the PEG20K precursor on a gold mylar substrate. The doublet associated with the S2P peak of sulphur with a peak separation of ~1.2eV appears at ~ 164eV which corresponds to literature reported data for the shift of the S2P peak [S2,S3]. This is the sole sulphur peak observed; which confirms that only one oxidation state of sulphur is present the QTh coating i.e. no destruction of the thiophene ring structure has occurred.

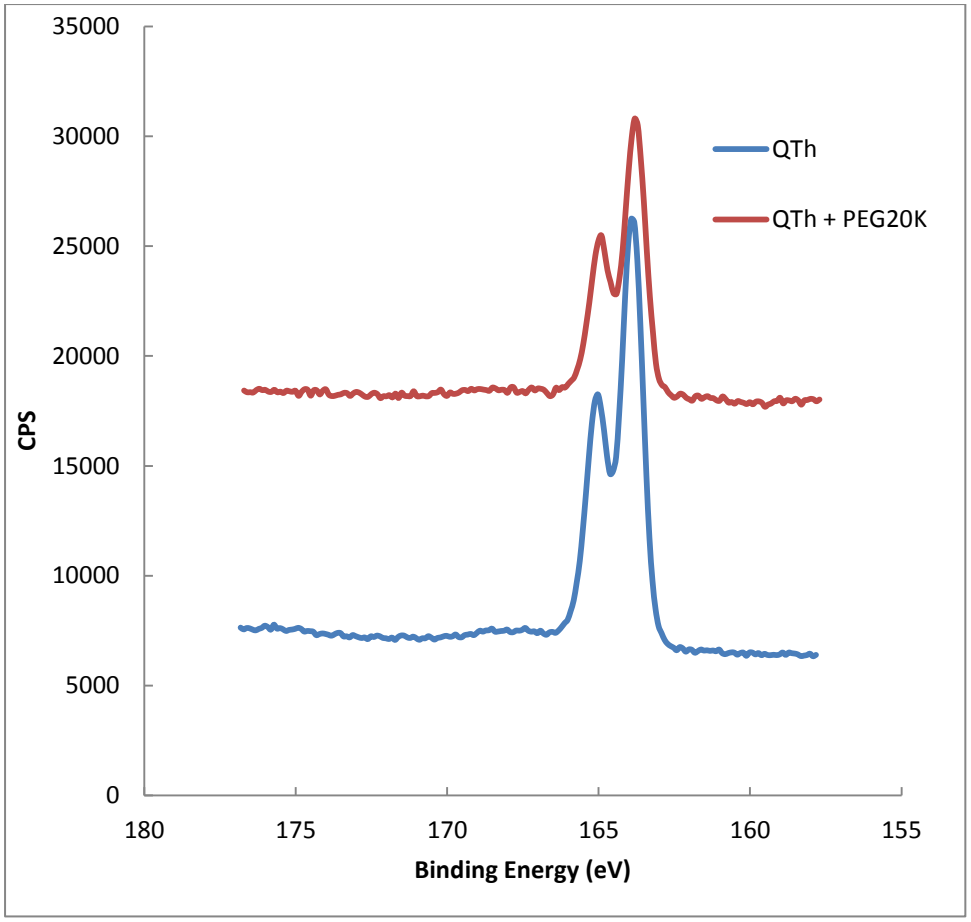

Figure S3 – A Figure of the S2P curves of Au mylar, PVD QTh on Au mylar and PVD QTh on Au mylar from a PEG20K precursor.

Atomic % calculation from XPS is shown in Table S1 below.

Table S1 – A table of the atomic percentages measured by XPS, and the calculation determining the deposited C/S ratios on a gold on goretex substrate

	QTh		**QTh from QTh PEG20K**		**Au on Goretex substrate**	
Atomic%	**Mean**	***Std***	**Mean**	***Std***	**Mean**	***Std***
F	**12.1**	*0.4*	**7.88**	*0.09*	**14.9**	*0.3*
O	**4.8**	*0.2*	**3.4**	*0.3*	**3.7**	*0.5*
C	**40**	*0.6*	**61**	*0.2*	**30**	*0.5*
S	**3.2**	*0.2*	**9.1**	*0.3*	**0**	*0*
Au	**39.4**	*0.2*	**17.4**	*0.4*	**50.4**	*0.3*
N	**0.5**	*0.4*	**1.2**	*0.2*	**1**	*0.3*
Baseline Ratios from Au on Goretex:						
C/F					2.01	
C contribution from substrate						
	24.3		15.9			
C in evaporant - C contribution from substrate						
F difference	15.6		45.1			
C/S ratio in remaining C:						
C/S	4.89		4.96			

References

S1 Ch. Kloc and R. Laudise. Vapor pressures of organic semiconductors: α-hexathiophene and α-quaterthiophene. *Journal of Crystal Growth*, 1998, **193**, 563-57

S2 K. Meerholz and J. Heinze, Electrochemical Solution and Solid-State Investigations on Conjugated Oligomers and Polymers of α-thiophene and the *p*-phenylene series, *Electrochimica Acta,* 1996, **41**, 1839-1854

S3 NIST X-ray Photoelectron spectroscopy Database, http://srdata.nist.gov/xps/Default.aspx, Accessed Feb 2015