

Supplementary Information

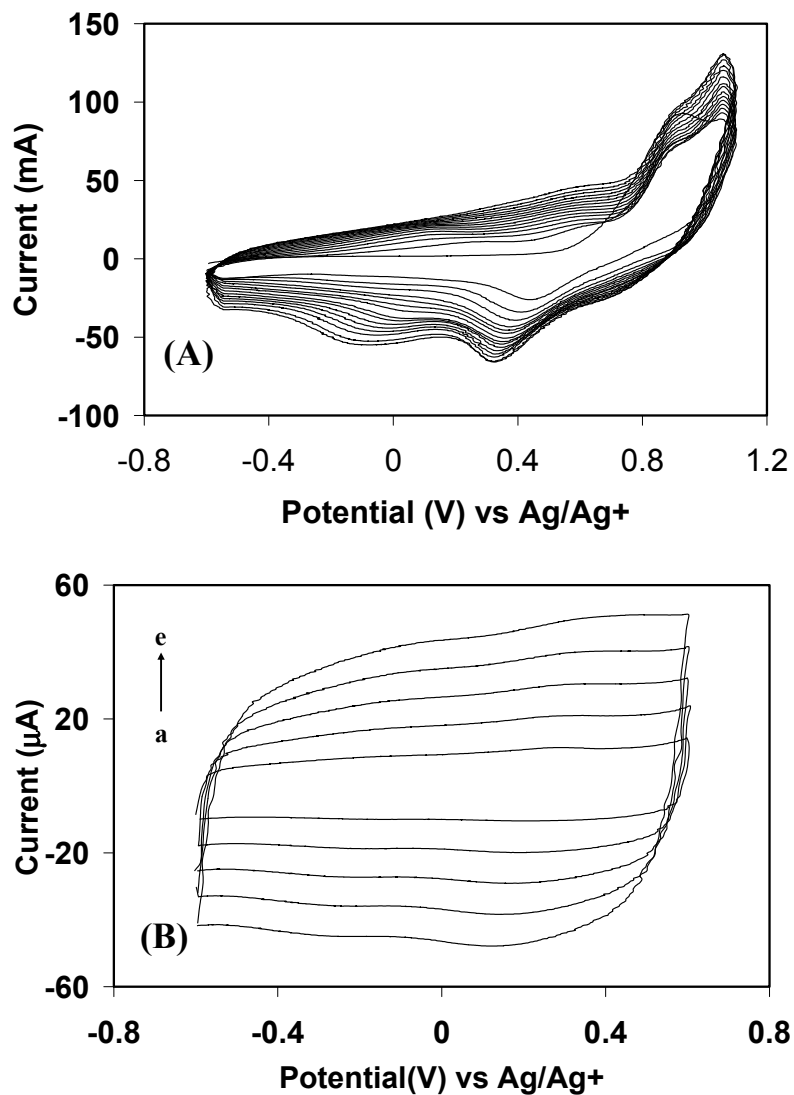


Figure S1: (A) Potentiodynamic electropolymerization of 0.02 M solution of **BEDOT-Se₂** at a scan rate of 100 mV s⁻¹ in 0.1 M TBAP/DCM. (B) Scan rate dependence of **PBEDOT-Se₂** in 0.1 M TBAP/DCM: a) 50 mV s⁻¹, b) 100 mV s⁻¹, c) 150 mV s⁻¹, d) 200 mV s⁻¹, e) 250 mV s⁻¹.

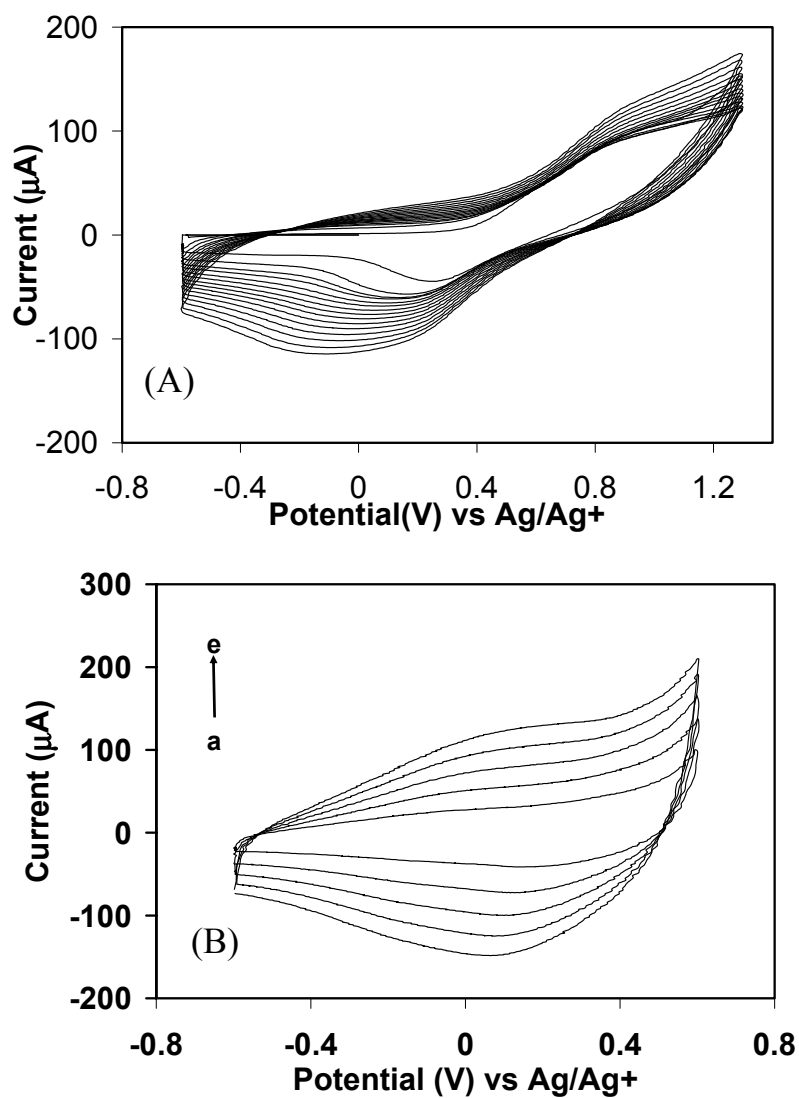


Figure S2: (A) Potentiodynamic electropolymerization of 0.02 M solution of **BEDOT-Te₂** at a scan rate of 100 mV s⁻¹ in 0.1 M TBAP/DCM. (B) Scan rate dependence of **PBEDOT-Te₂** in 0.1 M TBAP/DCM: a) 50 mV s⁻¹, b) 100 mV s⁻¹, c) 150 mV s⁻¹, d) 200 mV s⁻¹, e) 250 mV s⁻¹.

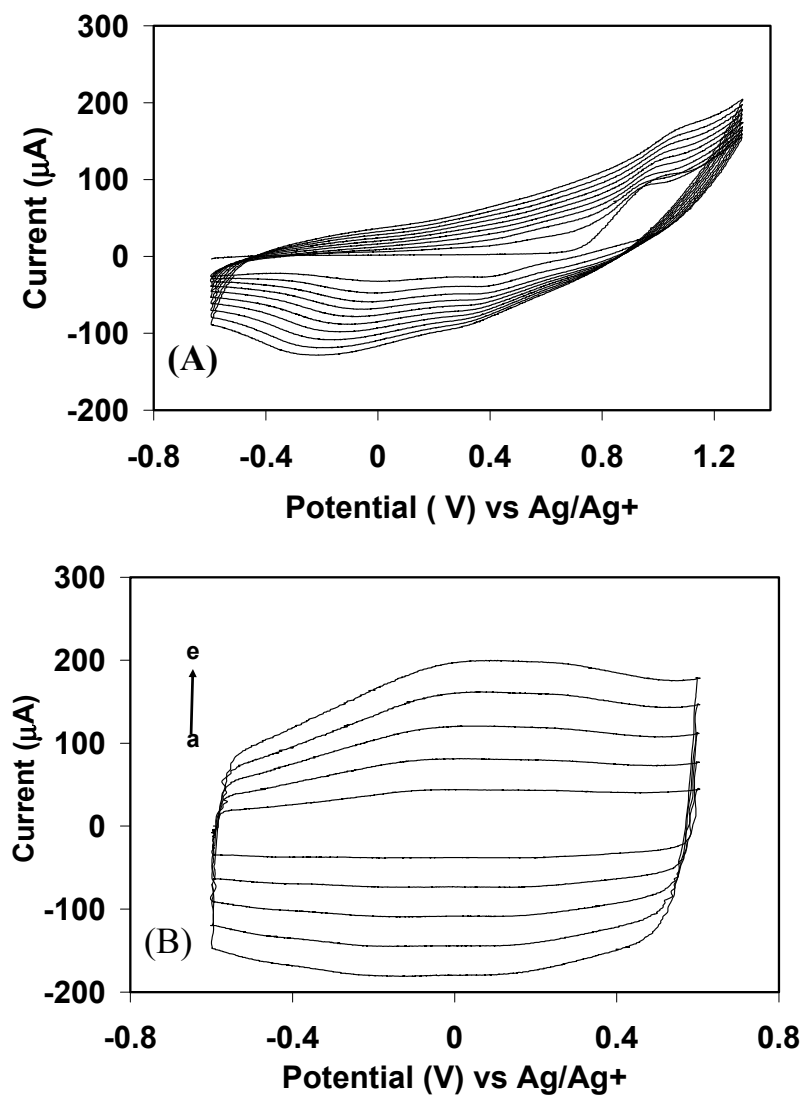


Figure S3: (A) Potentiodynamic electropolymerization of 0.02 M solution of **BEDOT-Te** at a scan rate of 100 mV s⁻¹ in 0.1 M TBAP/DCM. (B) Scan rate dependence of **PBEDOT-Te** in 0.1 M TBAP/DCM: a) 50 mV s⁻¹, b) 100 mVs⁻¹, c) 150 mV s⁻¹, d) 200 mV s⁻¹, e) 250 mV s⁻¹.

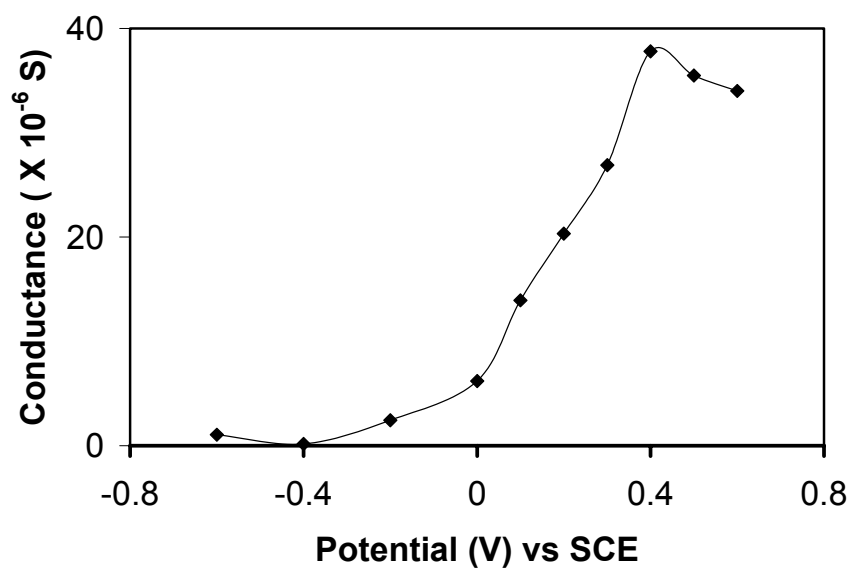


Figure S4: *In situ* conductance as a function of applied potential for **P BEDOT-S₂** in 0.1 M TBAP in DCM.

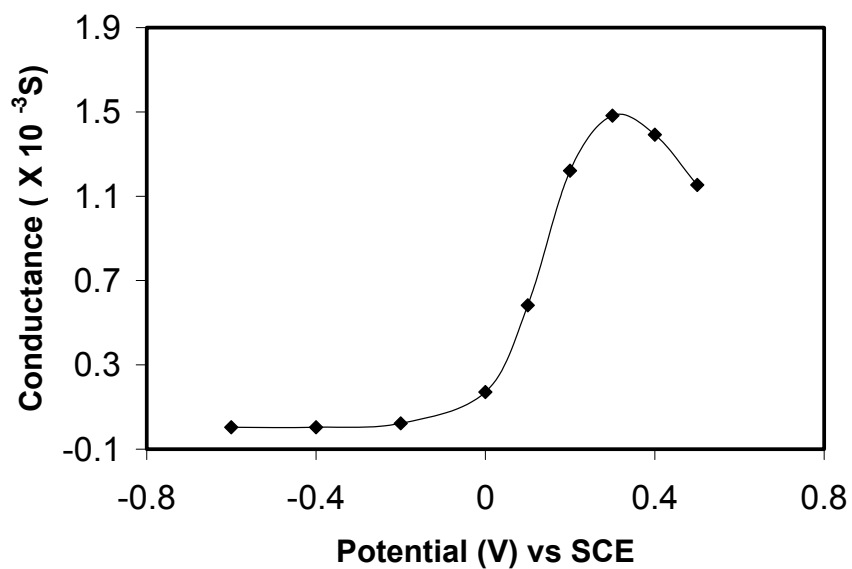


Figure S5: *In situ* conductance as a function of applied potential for **PBEDOT-Te₂** in 0.1 M TBAP in DCM.

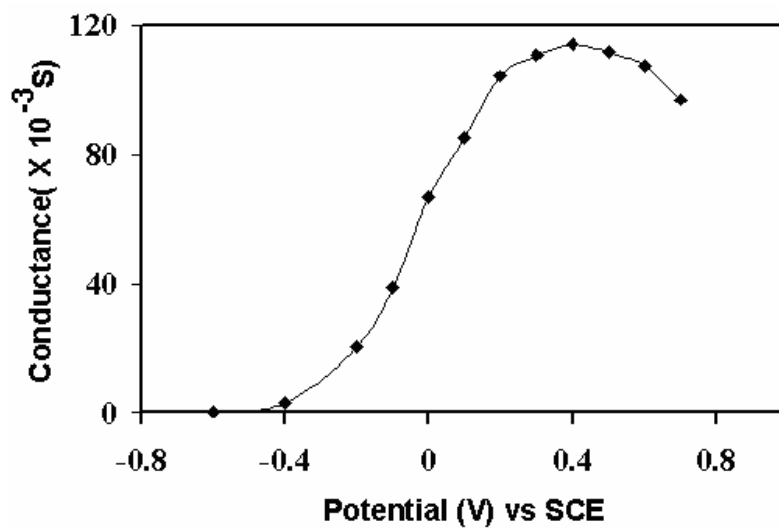


Figure S6: *In situ* conductance as a function of applied potential for **PBEDOT-Se** in 0.1 M TBAP in DCM.

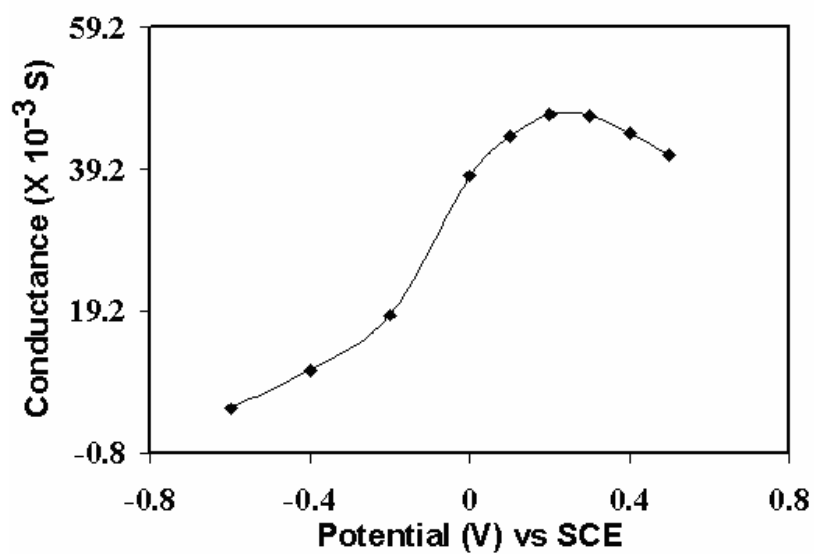


Figure S7: In situ conductance as a function of applied potential for **PBEDOT-Te** in 0.1 M TBAP in DCM.

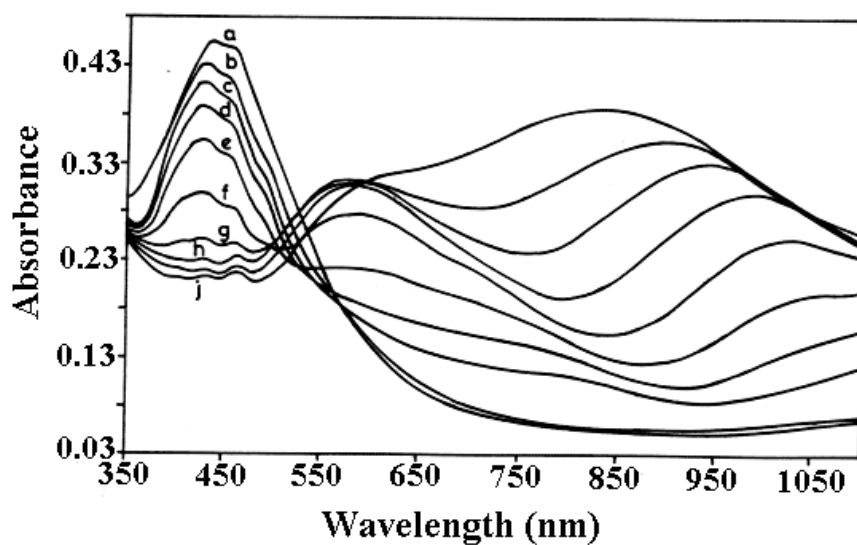


Figure S8: Spectroelectrochemistry of **PBEDOT-Se₂ (P157)** in 0.1 M TBAP/DCM as a function of applied potentials; a) -1 V, b) -0.4 V, c) 0.3 V, d) 0.4 V, e) 0.5 V, f) 0.6 V, g) 0.7 V, h) 0.8 V, i) 0.9 V, j) 1.0 V.

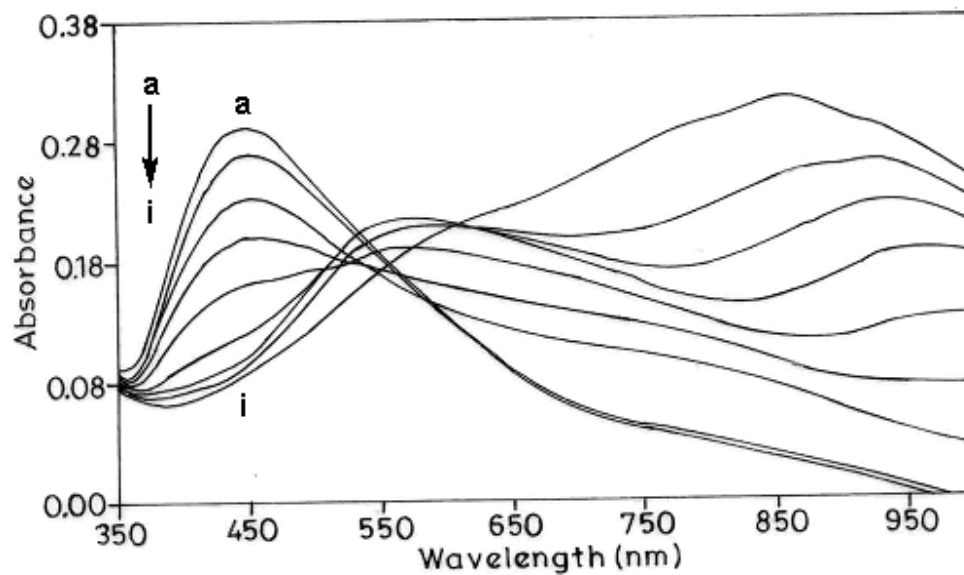


Figure S9: Spectroelectrochemistry of **PBEDOT-Te** in 0.1 M TBAP/DCM as a function of applied potentials. a) -1 V, (b) -0.4 V, c) 0.1 V, d) 0.2 V, e) 0.3 V, f) 0.4 V, g) 0.5 V, h) 0.6 V, i) 1.0 V.

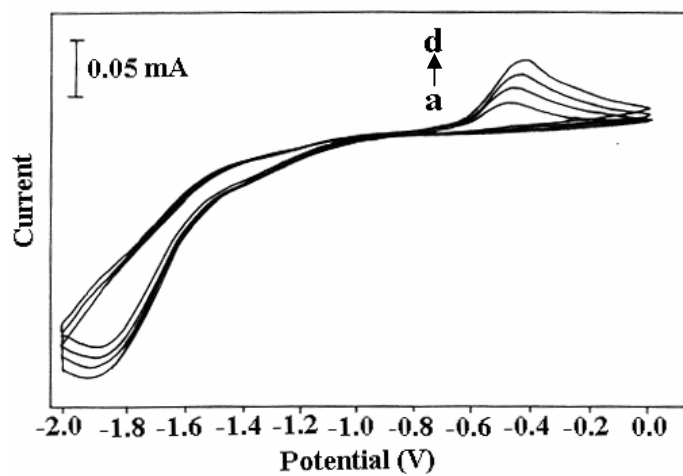


Figure S10: Cyclic voltammograms (between -2.0 and 0.0 V) of **PBEDOT-S₂** in 0.1 M TBAP/DCM at various scan rates: a) 100 mV s⁻¹, b) 200 mV s⁻¹, c) 300 mV s⁻¹, d) 400 mV s⁻¹.