

## Supporting Information

### Highly Stretchable and Aqueous Solutions-Stable Poly(3,4-ethylenedioxythiophene) Doped with Elastomeric Sulfonated-SEBS

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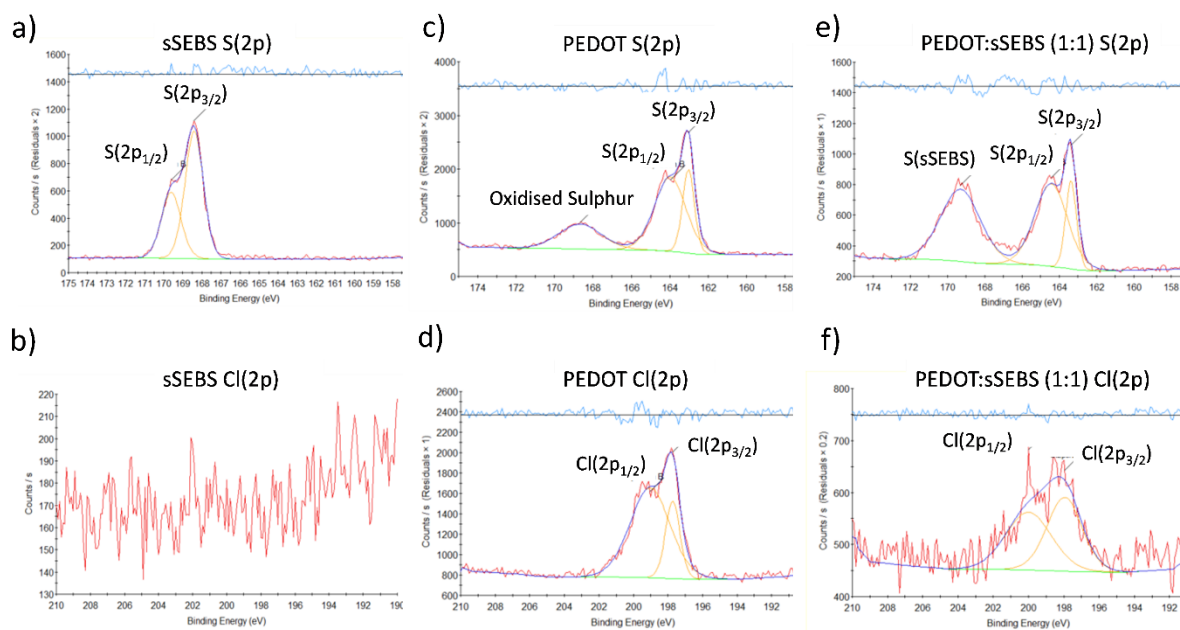


Figure S1. Core level XPS spectra of sSEBS, PEDOT, and PEDOT:sSEBS. a) S(2p) and b) Cl(2p) of sSEBS. c) S(2p) and d) Cl(2p) of pristine PEDOT. e) S(2p) and f) Cl(2p) of PEDOT:sSEBS (1:1 mass:mass).

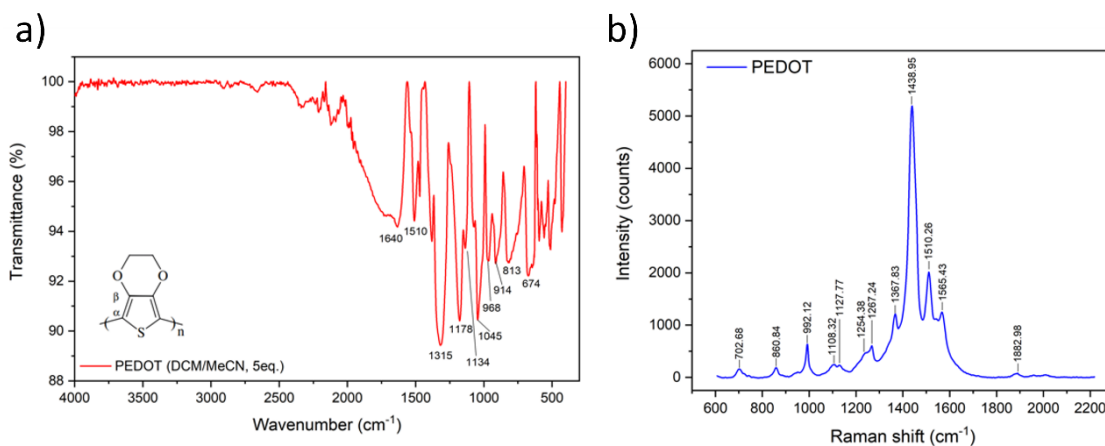


Figure S2. a) FTIR spectrum of PEDOT prepared using DCM/acetonitrile (1:2 volume ratio) and 5 molar equivalents of  $\text{FeCl}_3$  against EDOT. b) Raman spectrum (532 nm excitation wavelength) of PEDOT synthesised in dichloromethane/acetonitrile (2:1 volume ratio) using 5 molar equivalents of  $\text{FeCl}_3$  against EDOT.

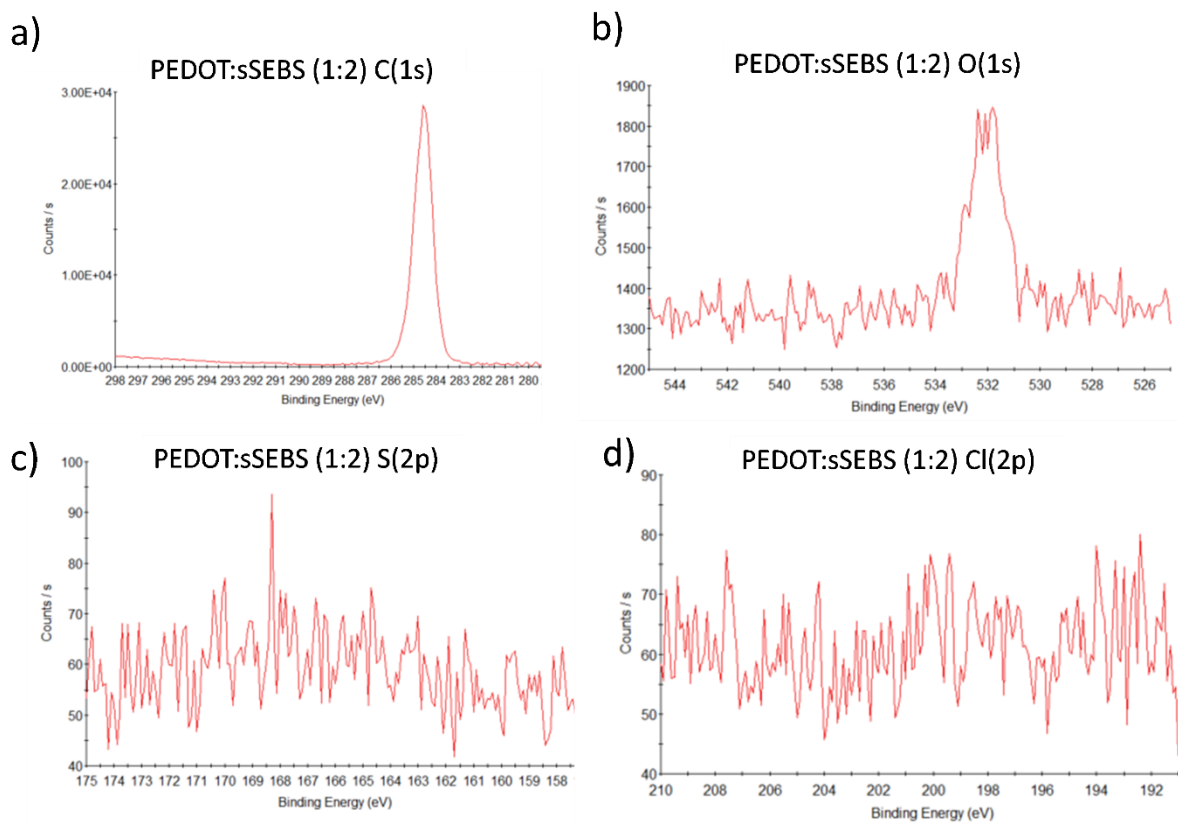


Figure S3. Core level XPS spectra of PEDOT:sSEBS (1:2 mass:mass). a) C(1s), b) O(1s), c) S(2p), and d) Cl(2p).

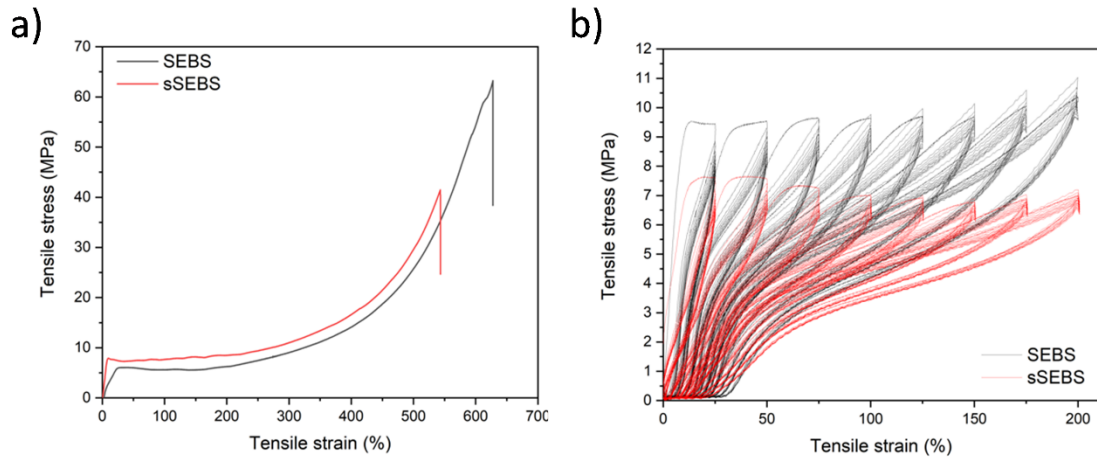


Figure S4. a) Stress-strain curve of SEBS and sSEBS stretched at 5% s<sup>-1</sup> strain rate. b) Cyclic loading of SEBS and sSEBS films with a pre-stretching cycle at 5% s<sup>-1</sup>, followed by 10 cycles of stretching to the target strain (25, 50, 75, 100, 125, 150, 175, 200%) over 5 seconds.

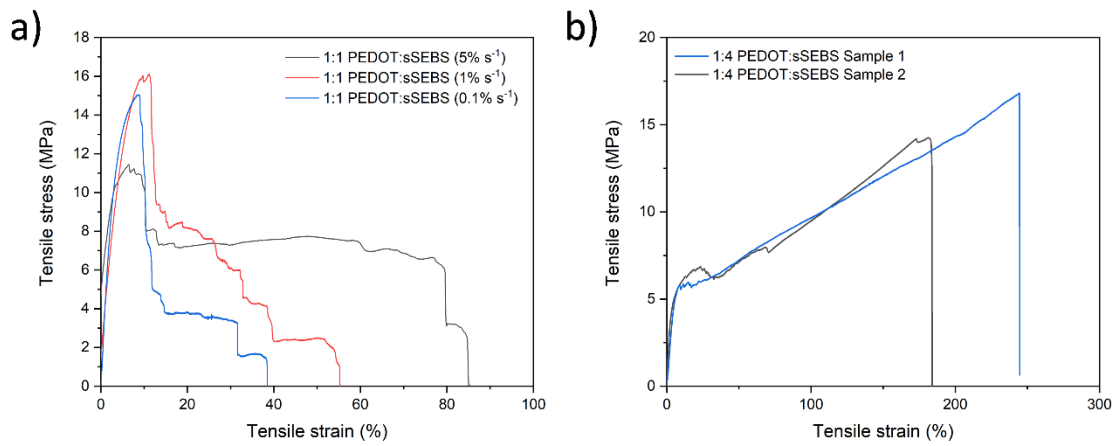


Figure S5. a) Stress-strain curves of PEDOT:sSEBS (1:1 mass ratio) films at various strain rates (5% s<sup>-1</sup>, 1% s<sup>-1</sup>, 0.1% s<sup>-1</sup>) and b) Stress-strain curves of PEDOT:sSEBS (1:4 mass ratio).