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Vapor Phase Organic Chemistry to Deposit Conjugated Polymer Films on Arbitrary Substrates

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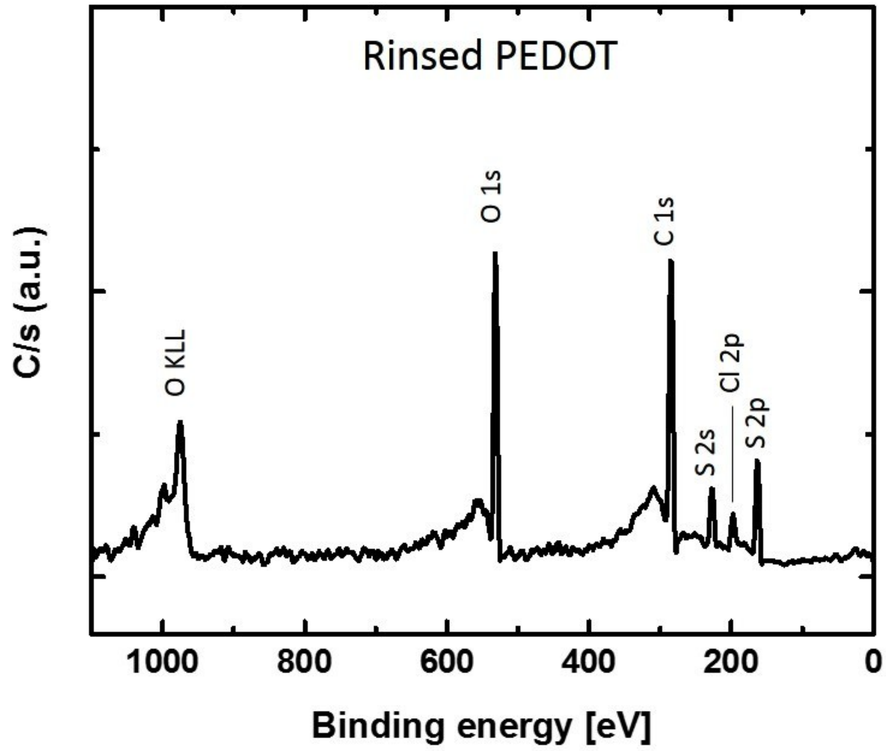

Figure S1. (a) XPS spectra of a 1x2 inch glass slide coated with a 100 nm thick film of *p*-doped PEDOT using an $FeCl_3$ oxidant and Chamber 1, after rinsing with methanol. This spectrum lacks any peaks in the 700-1000 eV region in which peaks arising from the 3s and 3d valence electrons of various iron compounds are expected. This absence of peaks confirms that the polymer films obtained after rinsing are heavy-metal free.

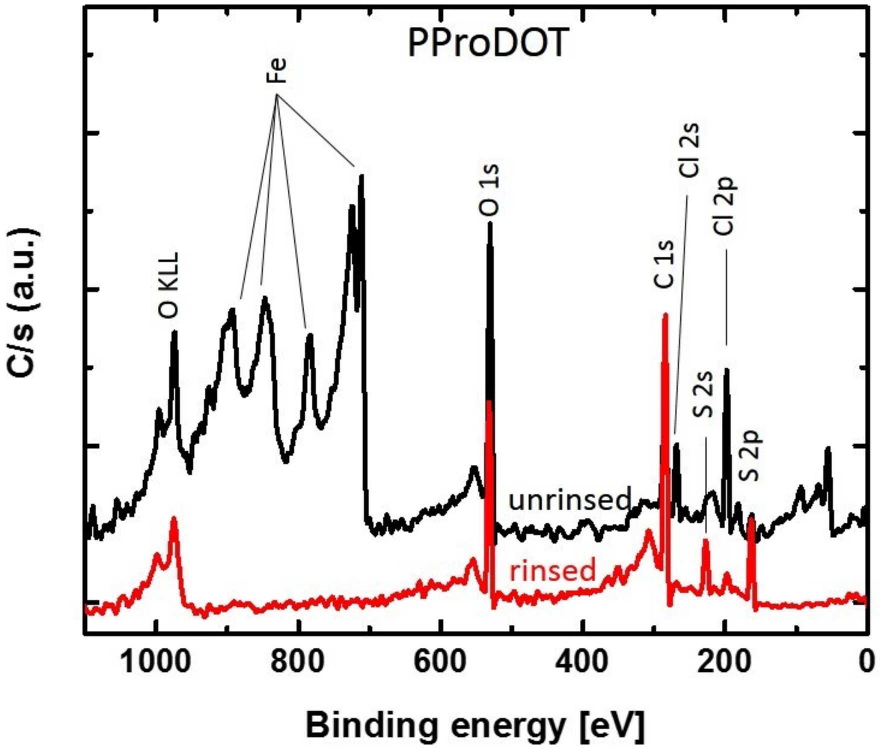

Figure S2. (a) XPS spectra of a 1x2 inch glass slide coated with a 100 nm thick film of *p*-doped PProDOT using an $FeCl_3$ oxidant and Chamber 2, immediately after deposition (black line) and after rinsing (red line) with methanol. These spectra reveal the absence of any iron salts after rinsing, confirming that the polymer films obtained after rinsing are heavy-metal free.

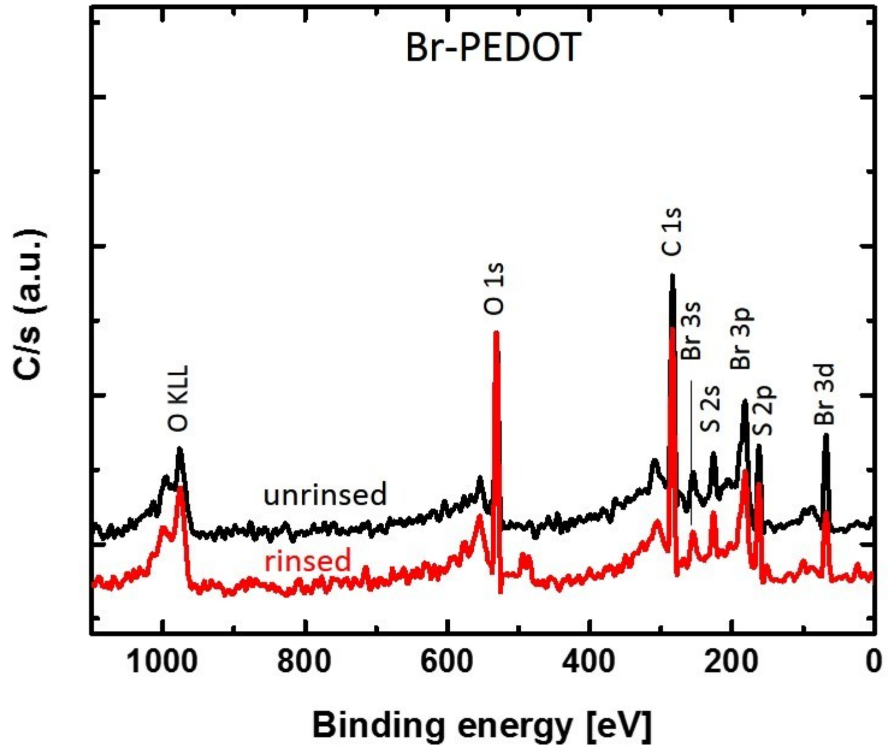

Figure S3. XPS spectra of a 1x2 inch glass slide coated with a 100 nm thick film of *p*-doped PEDOT using a Br_2 oxidant and Chamber 2, immediately after deposition (black line) and after rinsing (red line) with methanol. These spectra reveal that the bromide ion percentages remain constant before and after rinsing, as expected, since Br_2 is a volatile oxidant that is not expected to be found trapped in the unrinsed polymer film. The bromide ion peaks observed in the XPS spectra of these films arise from the bromide counterion in the *p*-doped PEDOT film.

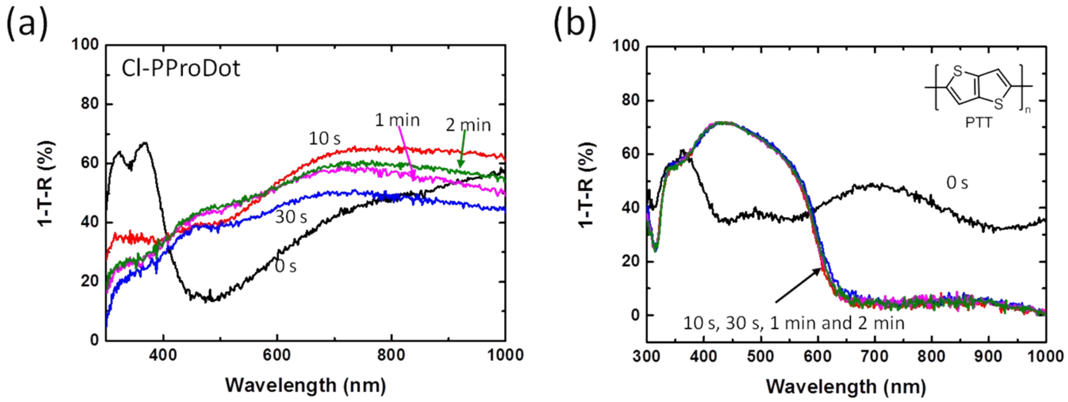

Figure S4. (a) Absorbance, measured as 1-transmittance-reflectance, spectra of a 1x2 inch glass slide coated with a 100 nm thick film of *p*-doped PProDOT using an $FeCl_3$ oxidant and Chamber 2, immediately after deposition (0 s, black) and after varying methanol rinse times. The strong absorbance bands between 350 – 400 nm observed for the as-deposited film likely arise from trapped $FeCl_3$. The intensity of absorbance bands beyond 400 nm increases after a 10-second rinse, likely because a surface layer of $FeCl_3$ and ProDot monomer is removed. After rinsing for 30 seconds, the absorption bands past 600 nm decrease, indicating that the doping level decreases. Further rinsing for 1 min and 2 min causes a slight increase of the intensity of absorption band past 600 nm, likely due to air (oxygen) doping. Once dried, the film absorption remains stable and unchanged, even after storing under ambient conditions for three months. (b) Absorbance, measured as 1-transmittance-reflectance, spectra of a 1x2 inch glass slide coated with a 100 nm thick film of *p*-doped PTT using an $FeCl_3$ oxidant and Chamber 2, immediately after deposition (0 s, black) and after varying methanol rinse times.

Figure S5. Photographs of the side view of (a) PTT vapor coated towel (b) P3HT dipcoated towel and (c) corduroy spun coat with PEDOT:PSS. Dipcoating fully dyes the towel but vapor deposition and spincoating result in primarily surface coatings.