Supplementary Information (SI) for Nanoscale Horizons.

Supporting Information for
Oxygen-driven doping of conjugated polymers in aqueous media via anion adsorption

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Contents

1. Supplementary Methods and Discussion.

1.1 PBTTT film's thickness by AFM

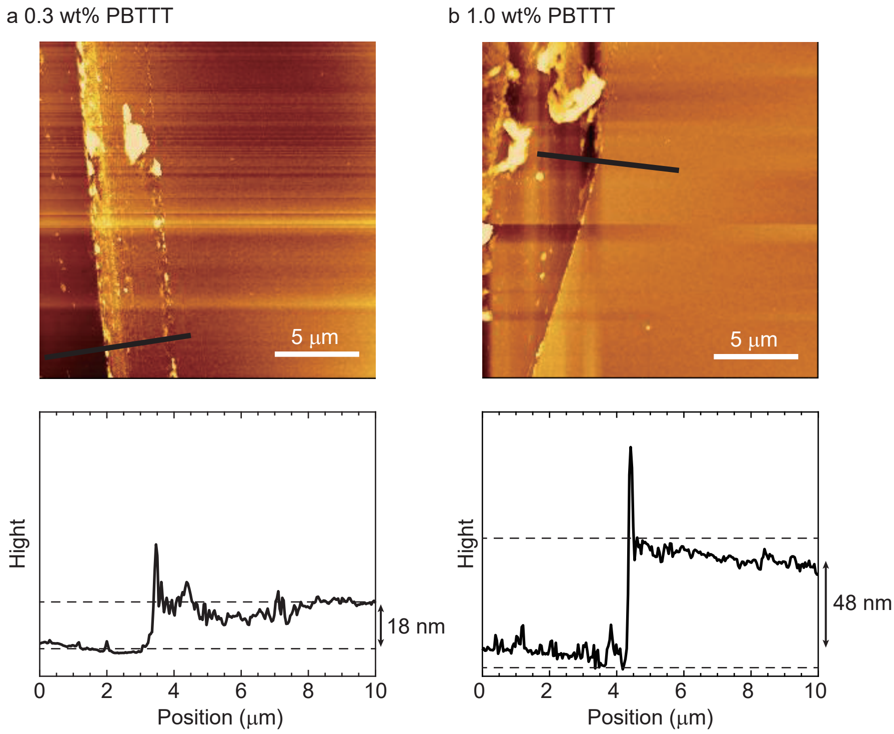


Figure S1: AFM topographic images (5 μm $\times$ 5 μm) and cross-sectional profiles of films prepared from (a)using 0.3 wt% and (b) using 1.0 wt% solution,used to determine the film thickness

1.2 Ambient Stability of Doped PBTTT Films

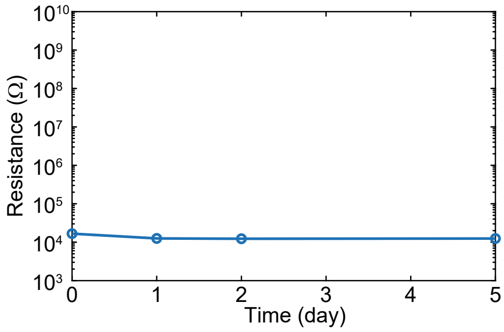


Figure S2: The ambient stability of our TFPB-doped PBTTT films was evaluated by monitoring changes in their electrical resistance under ambient conditions. A PBTTT thin film coated from a 0.3 wt% solution was used.

1.3 Effect of PBTTT Film Thickness on Doping Kinetics

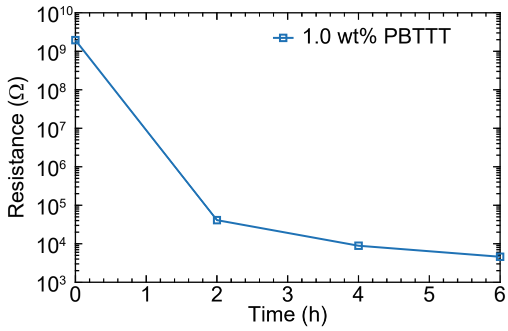
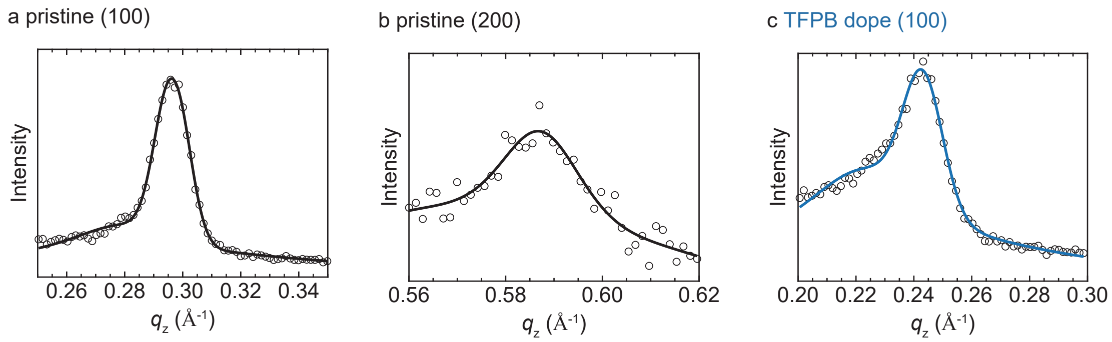


Figure S3: Doping progression in a thin film coated from a 1 wt% solution.

1.4 Structure of PBTTT film



pristine PBTTT peak		
	peak position (Å^{-1})	FWHM
100	0.296	0.016
200	0.587	0.049

After TFPB doping peak		
	peak position (Å^{-1})	FWHM
100	0.242	0.037

Figure S4: XRD spectra of (a, b) pristine PBTTT thin films and (c) PBTTT thin films immersed in a pH 2 aqueous solution containing LiTFPB.

1.5 The effect of dissolved oxygen

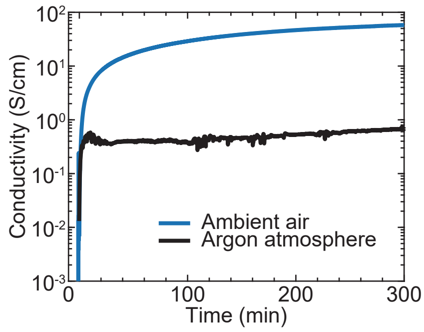


Figure S5: Continuous conductivity measurements under argon and ambient conditions to reveal the effect of dissolved oxygen.

1.6 Applicability of Oxygen-Driven Doping

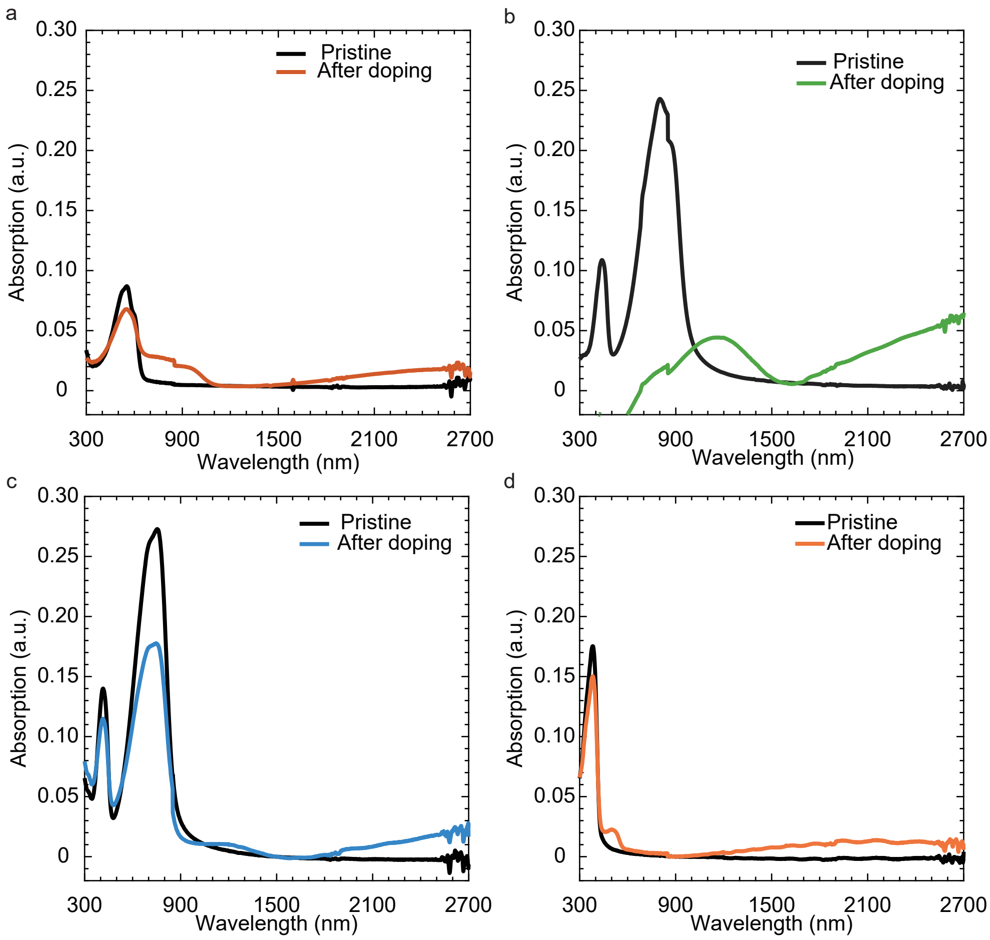


Figure S6: Optical absorption changes of each semiconducting polymer before and after oxygen-based doping. (a) Poly(3-hexylthiophene-2,5-diyl) (P3HT) (b) Poly(cyclopentadithiophene-benzothiadiazole) (CDT-BTZ) (c) Poly(4-octyl triphenylamine) (poly-TPD-C8) (d) Poly[2,6-(4,4-bis(2-ethylhexyl)-4*H*-cyclopenta[2,1-*b*:3,4-*b*']dithiophene)-*alt*-4,7-(2,1,3-benzothiadiazole)] (PCPDTBT)

1.7 Anion adsorption on SAM film and PBTTT film

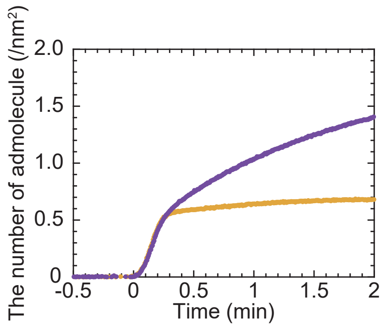


Figure S7: Logarithmic-scale plot of the mass change difference between SAM and PBTTT films, clarifying the distinction between surface adsorption and anion incorporation into the PBTTT bulk.

1.8 pH dependence of doping level

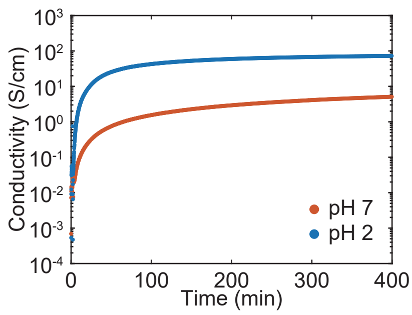


Figure S8: Continuous measurement of conductivity under different pH conditions in our method.