Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.

Supporting Information

Large-area Printed Low-voltage Organic Thin Film Transistors via Minimal-solution Bar-coating

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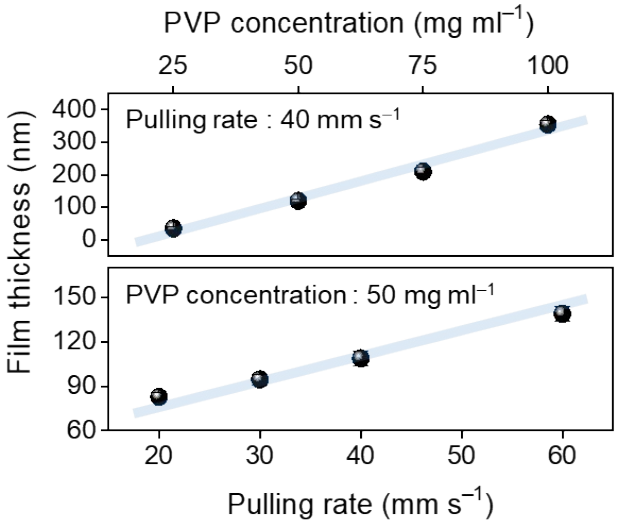


$Ca = \mu v / \gamma$

Ca : capillary number = ~10^{-3}
μ : dynamic viscosity = 2.31 cP (25 ºC)
v : bar-pulling rate = 0.04 m s^{-1}
γ : surface tension of the solvent = 0.0269 N m^{-1}

(1 cP = 10^{-3} N·s m^{-2})

Figure S1. 2D graph for controllable thickness variation with solution concentration (from 25 to 100 mg ml^{-1}), bar-pulling rate (from 20 to 60 mm s^{-1}), and calculated capillary number from experimentally measured viscosity value for explanation of the increase of film thickness.

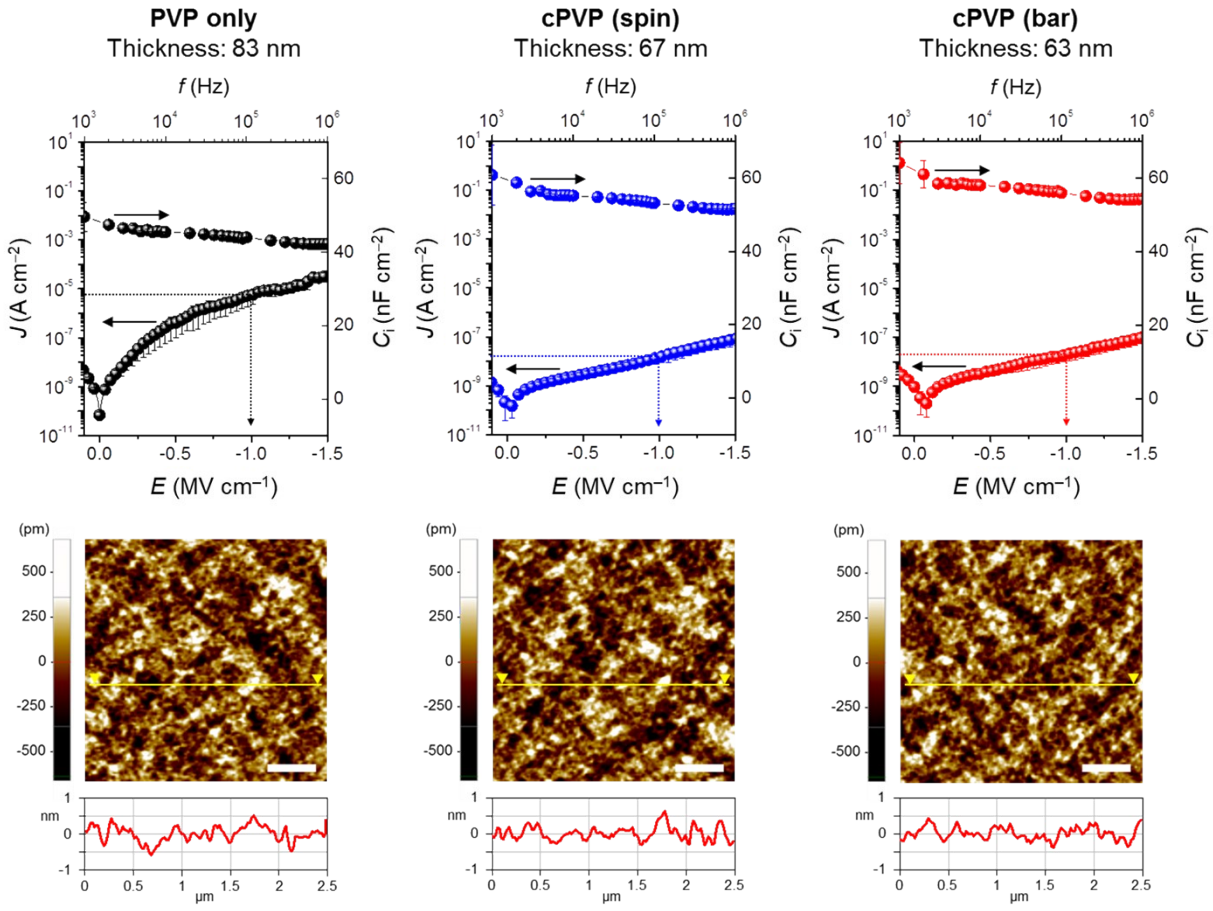


Figure S2. Leakage current density (J) versus electric field (E), capacitance (C_i) versus frequency (f), and AFM images of the pristine PVP (left), spin- (center) and bar-coated (right) cPVP films. Scale bars in the AFM images: 1 μm.

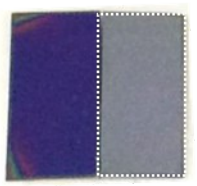
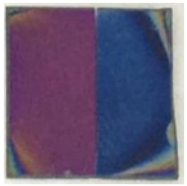
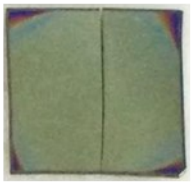
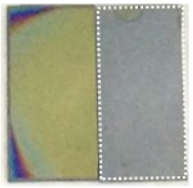
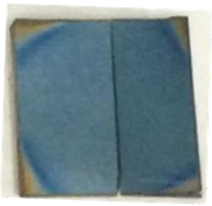
	150 ºC	200 ºC	250 ºC
cPVP			
PVP only			

Figure S3. Photographs that visualize the effect of cross-linker and annealing temperature on the chemical resistance of PVP. For each film, the right-hand side was immersed in the mother solvent (PGMEA). The cPVP films were made of PVP:HDA = 10:1 in weight.

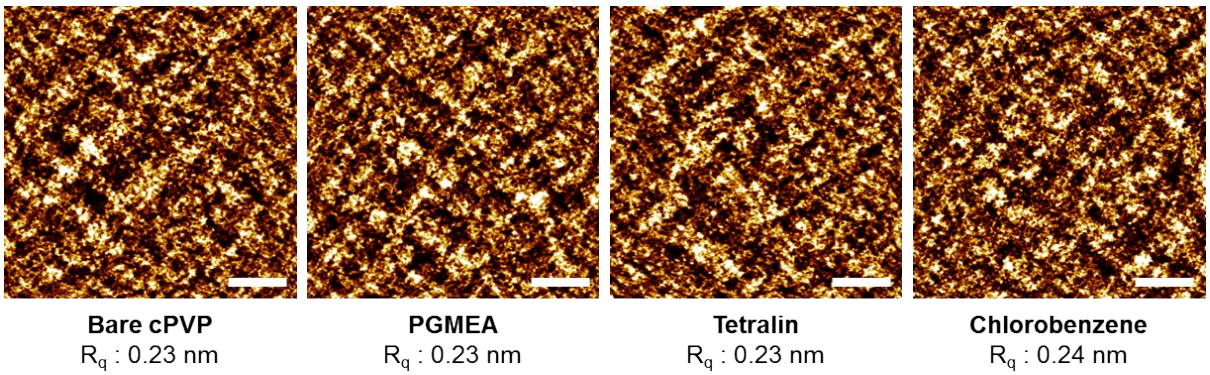


Figure S4. AFM topography of a fully cross-linked polymer film treated by various organic solvents (scale bars: 1 μm). Note that the roughness of bare cPVP remains practically unchanged upon solvent treatment.

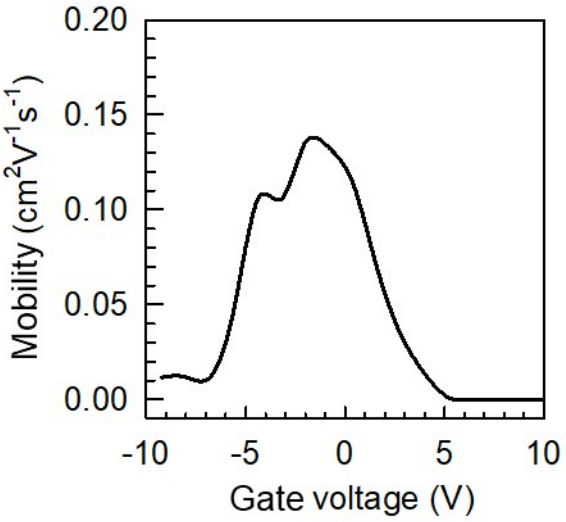


Figure S5. Gate-voltage dependent mobility extracted in the saturation regime of the diF-TES-ADT OTFT.

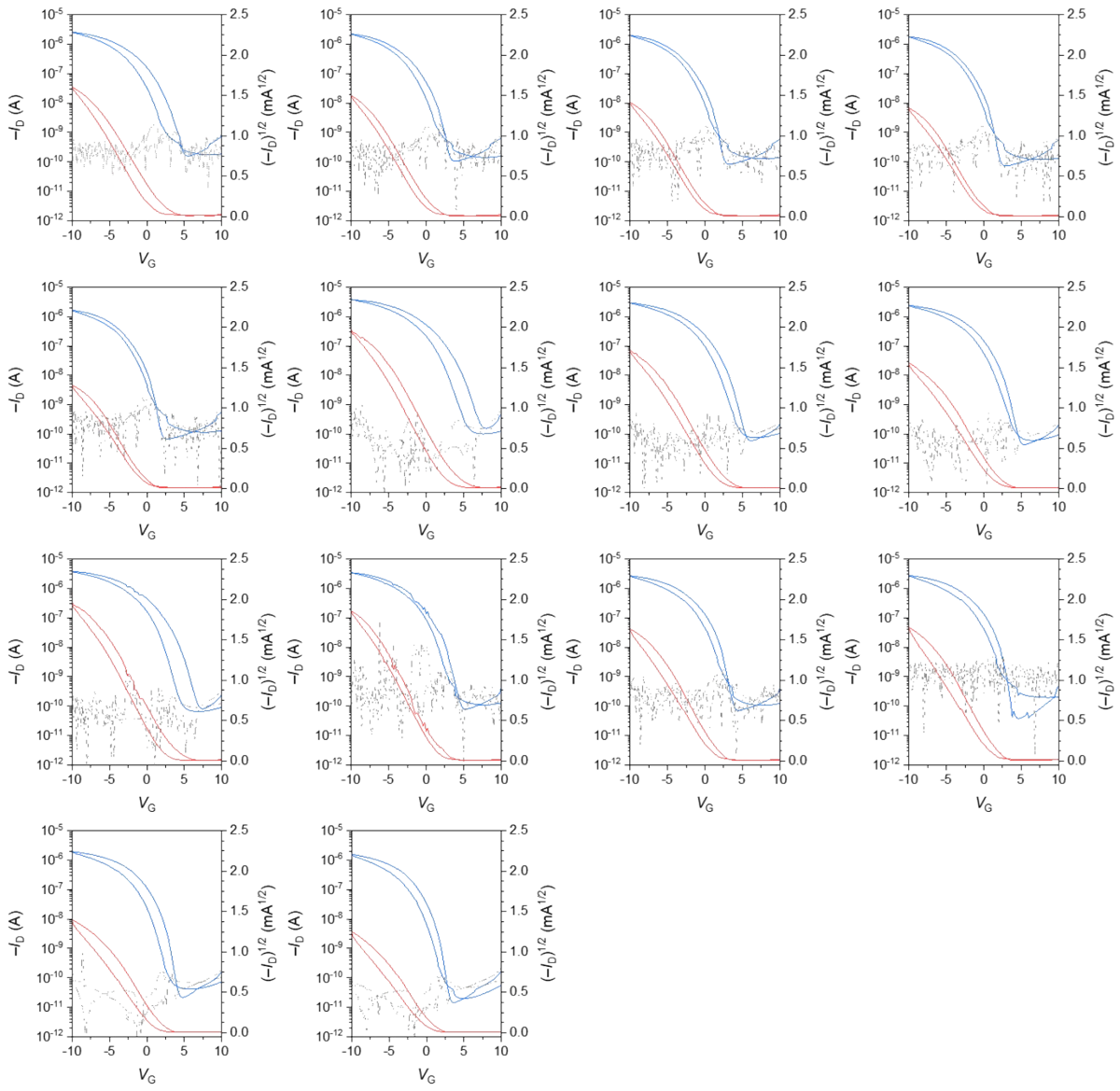


Figure S6. Transfer characteristics of 14 OTFT devices using diF-TES-ADT semiconductor and c-PVP dielectric which were prepared at the same bar-coating condition.