Supporting Information

High-Performance Organic Field-Effect Transistors with Dielectric and Active Layers Printed Sequentially by Ultrasonic Spraying

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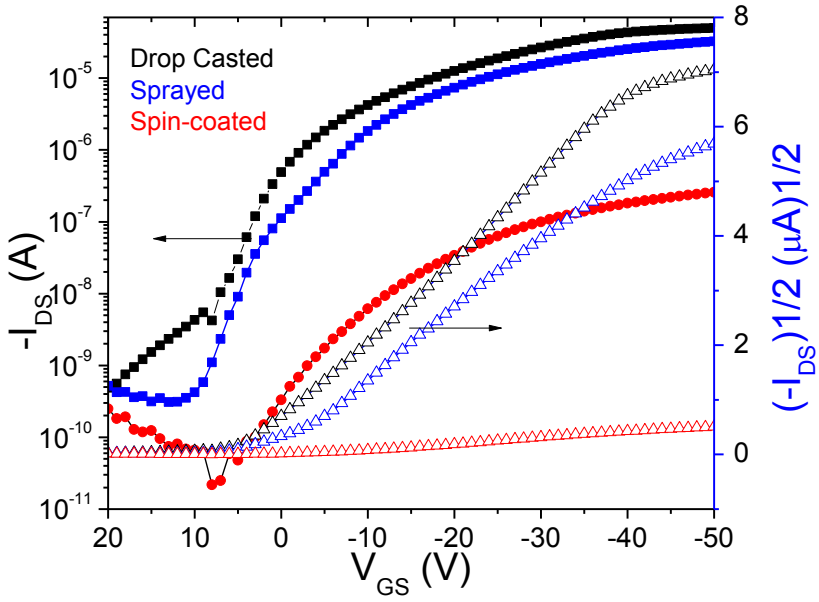

Figure S1. Current-voltage characteristics (I_{DS} versus V_{GS} measured in the saturation regime at V_{DS} = -40 V) for TIPS-PEN devices fabricated by drop-casting, spin-coating, and ultrasonic spray-coating processes. The right axis corresponds to the line with empty symbols and represent $I_d^{-1/2}$, and the left axis corresponds to the line with solid symbols and shows the log(I_{DS}).

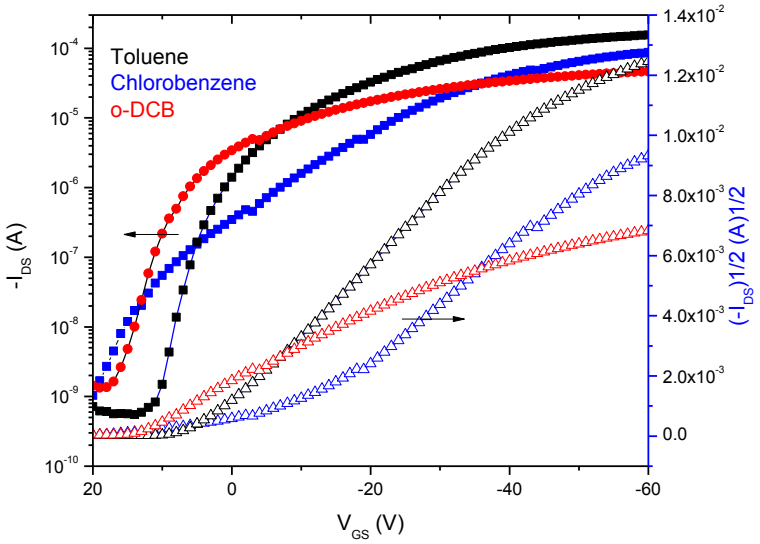

Figure S2. Current-voltage characteristics (I_{DS} versus V_{GS} measured in saturation regime at V_{DS} = -40 V) for ultrasonic spray-coated TIPS-PEN devices from toluene, chlorobenzene, and dichlorobenzene solutions.

Table S1 Device performance parameters of spray-coated TIPS-PEN FETs prepared from different solvents.

Solvent	Mobility (cm^2/Vs)	V_{th} (V)	On-off ratio
Toluene	0.143	-0.9	1.3×10^5
Chlorobenzene	0.054	-2.8	8.3×10^4
ODCB	0.032	13.2	3.1×10^4

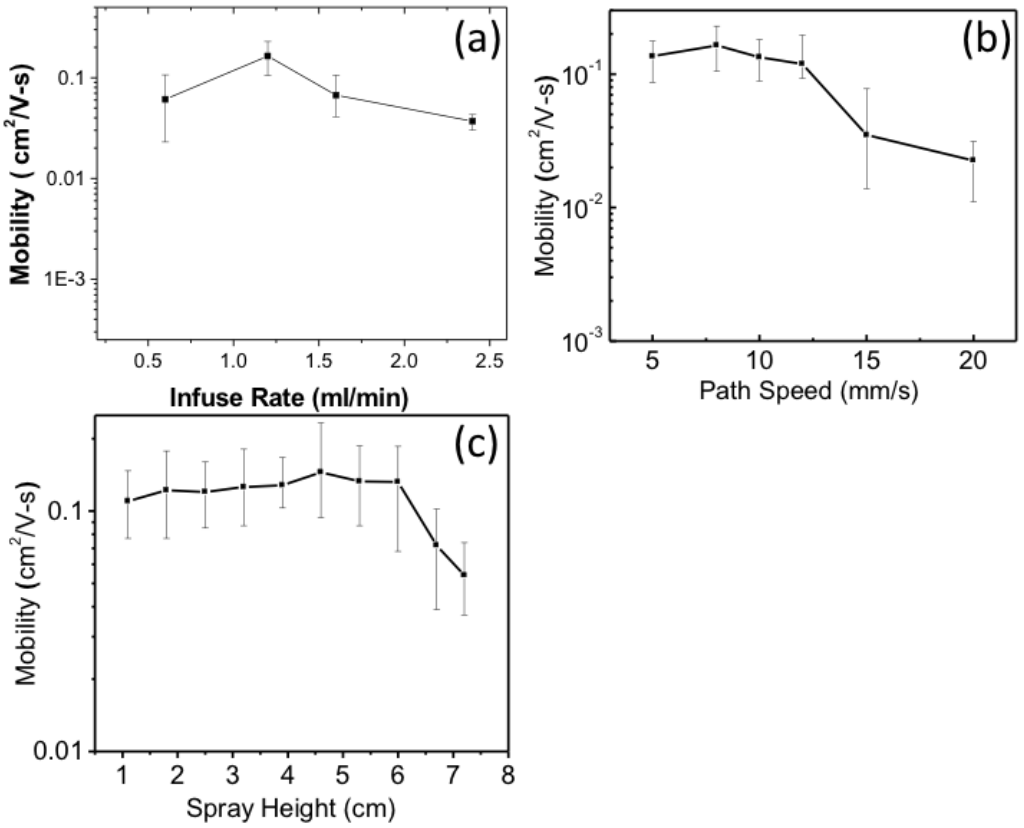

Figure S3. Variation in the field-effect mobilities of ultrasonic spray-coated TIPS-PEN OFETs on SiO_2/Si substrates (a) at different infuse rates while keeping the path speed (8 mm/s) and nozzle height (4.6 cm) fixed, (b) at different nozzle heights while keeping the infuse rate (1.2 ml/min) and path speed (8 mm/s) fixed. (c) at different path speeds while keeping the infuse rate (1.2 ml/min) and nozzle height (4.6 cm) fixed.

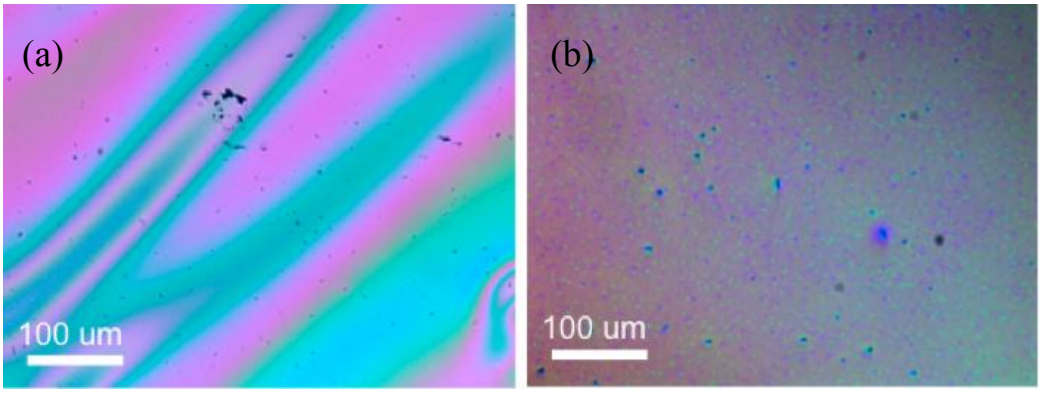

Figure S4. Optical images of a cross-linked PVP film on glass prepared by ultrasonic spray at (a) room temperature and (b) 50°C, demonstrating the higher uniformity of the spray-coated PVP film prepared at 50°C.

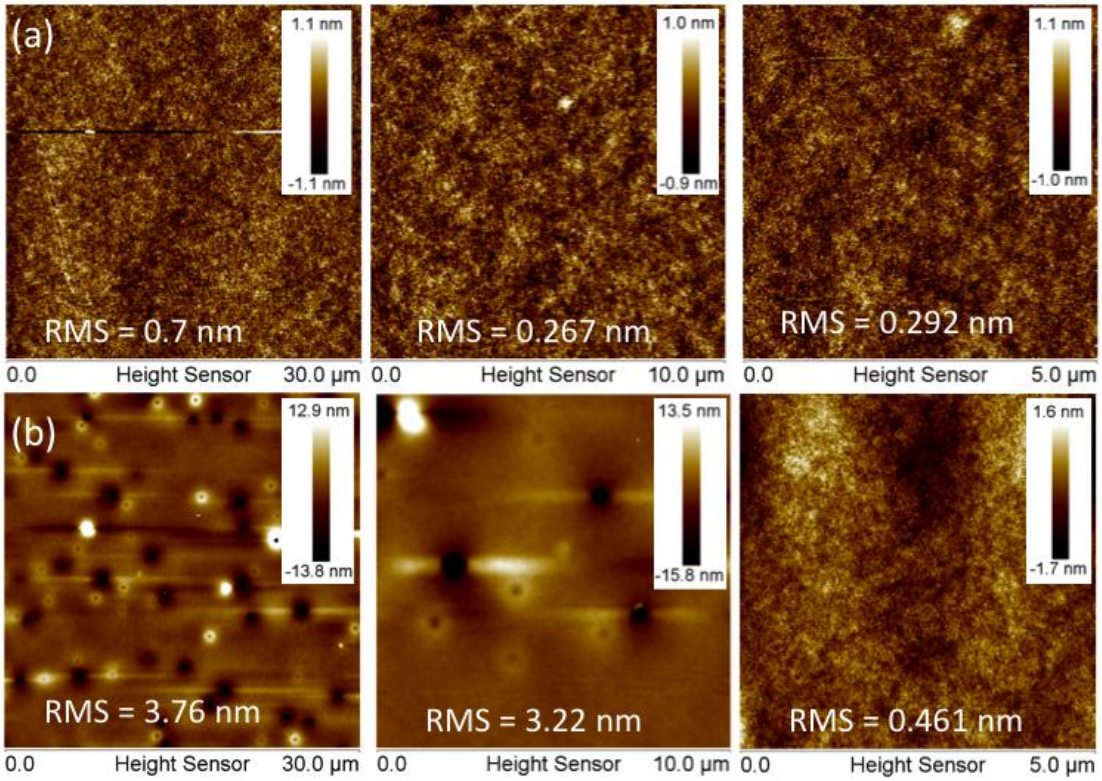

Figure S5. AFM morphologies and corresponding RMS roughnesses of (a) spin-coated and (b) ultrasonic spray-coated PVP films on different length scales.

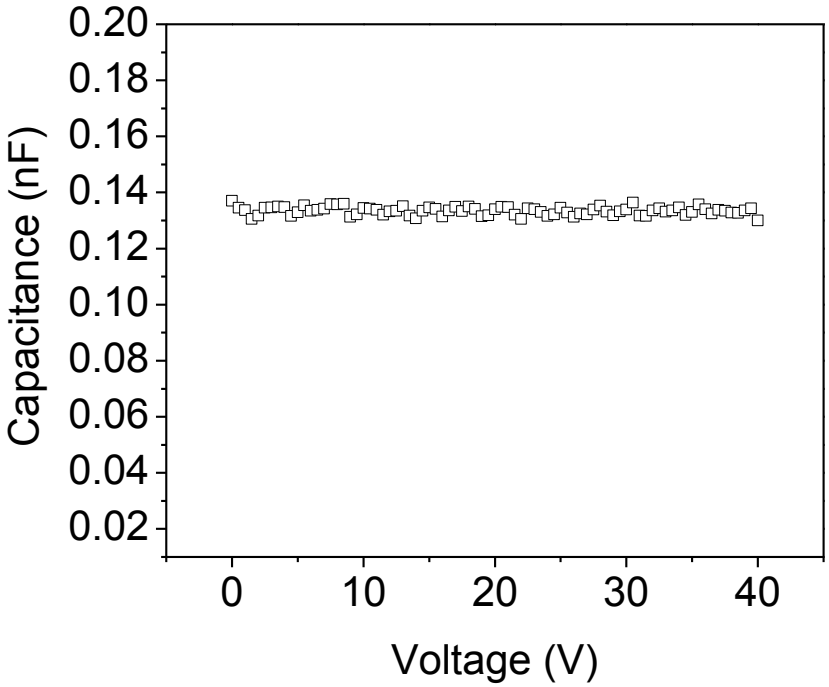

Figure S6. Voltage-dependent capacitance of the spray-coated PVP film at 200 Hz in metal-insulator-metal structure.

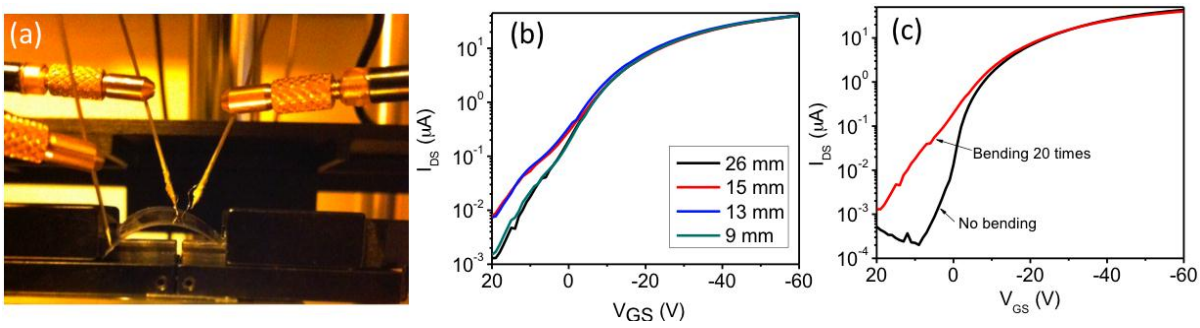

Figure S7. (a) A digital camera image of the OFET devices on a PET substrate in a bent configuration during electrical measurement. (b) No significant change of transfer characteristics of OFET with different bend radius values, R (26 mm, 15 mm, 13 mm, 9 mm). (c) No significant change of transfer characteristics of OFET after 20 cycles bending (R = 9 mm) are observed (before: black line, after: red line). The transfer curves are measured in the saturation regime at a drain bias of -40 V.