

Supporting information

Screen Printing as a Scalable and Low-cost Approach for Rigid and Flexible Thin-Film Transistors Using Separated Carbon Nanotubes

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1. Study of capillary effect on thicknesses of printed BTO layers

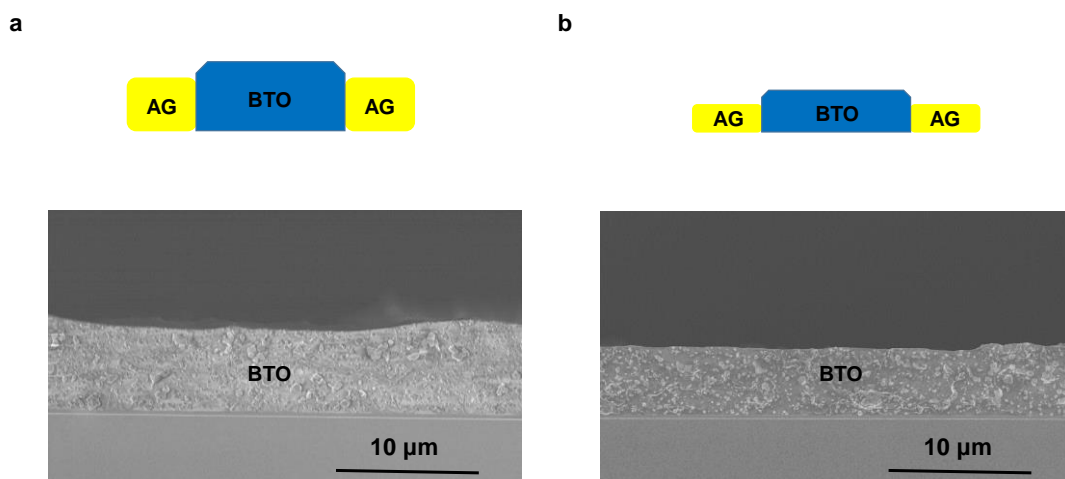


Figure S1. Schematic diagrams and SEM images illustrate the capillary effect on BTO

layers printed with different dilution conditions. (a) Source and drain were printed with diluted silver ink ($V_{sol}/V_{ink} = 1:4$) and then diluted BTO ink ($V_{sol}/V_{ink} = 1:4$) was printed as gate dielectric. (b) Source and drain were printed with diluted silver ink ($V_{sol}/V_{ink} = 1:3$) and then diluted BTO ink ($V_{sol}/V_{ink} = 1:4$) was printed as gate dielectric. The result shows a thinner BTO layer ($\sim 5 \mu\text{m}$) in (b) compared with the BTO layer ($\sim 6.5 \mu\text{m}$) in (a).

2. Study of profile of printed layers

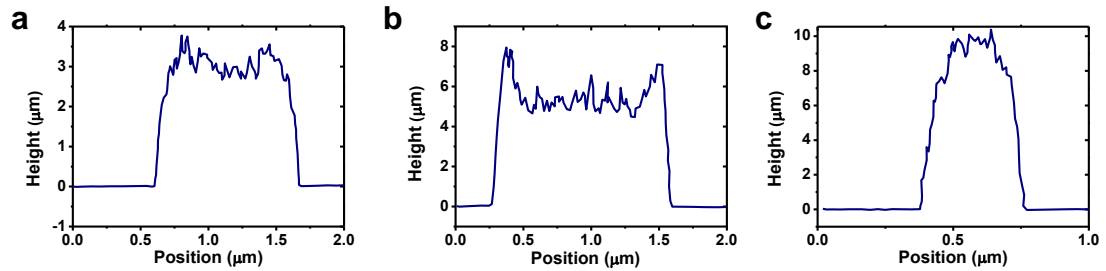


Figure S2. Profiles of printed electrode (a) using 1:3 silver ink, dielectric layer (b) using 1:4 BTO ink, and gate (c) using undiluted silver ink, showing approximate thickness $\sim 3.3 \mu\text{m}$, $5.1 \mu\text{m}$, and $9.8 \mu\text{m}$, respectively.

3. Study of gate leakage current

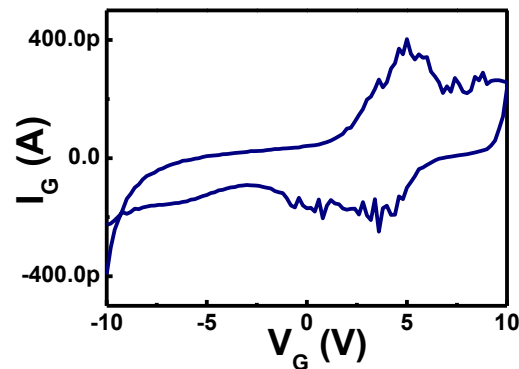


Figure S3. Gate leakage current of a presentative printed SWCNT TFT as a function of gate voltage at $V_{DS} = -1 \text{ V}$.

4. Statistical study of screen-printed SWCNT TFTs

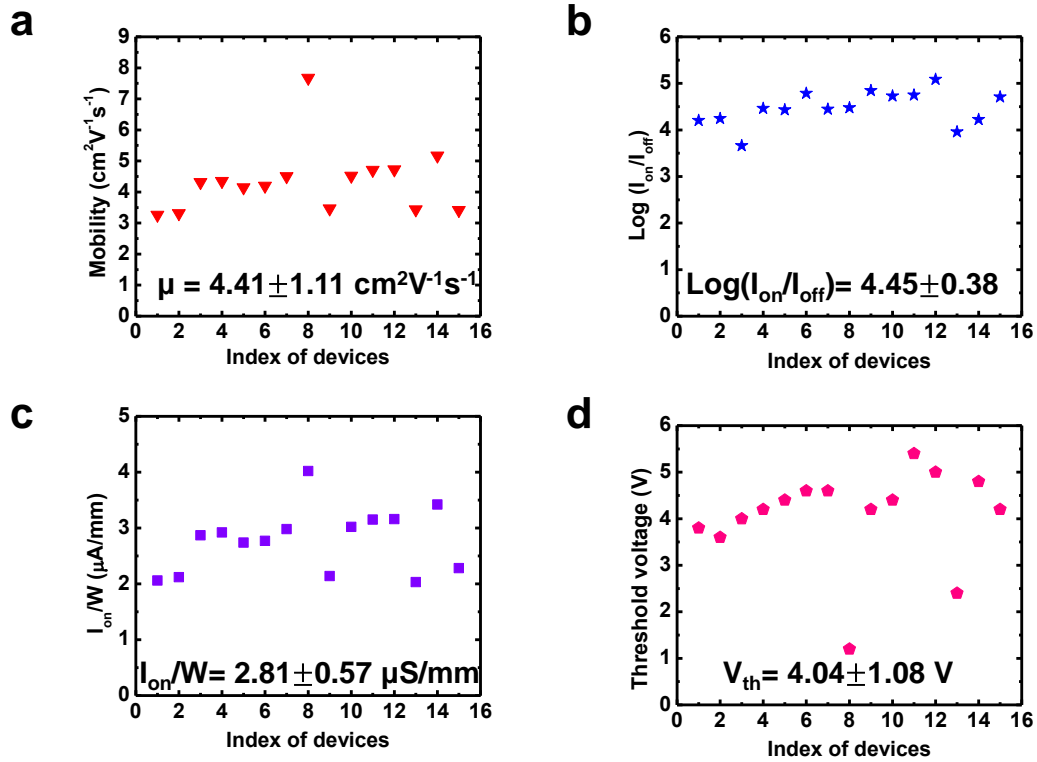


Figure S4. Statistical analysis of 15 fully screen printed SWCNT TFTs showing (a) field-effect mobility, (b) current on/off ratio, (c) on-current density, and (d) threshold voltage (V_{th}). The calculated average values and standard deviations are included in each figure.

5. OLED structure

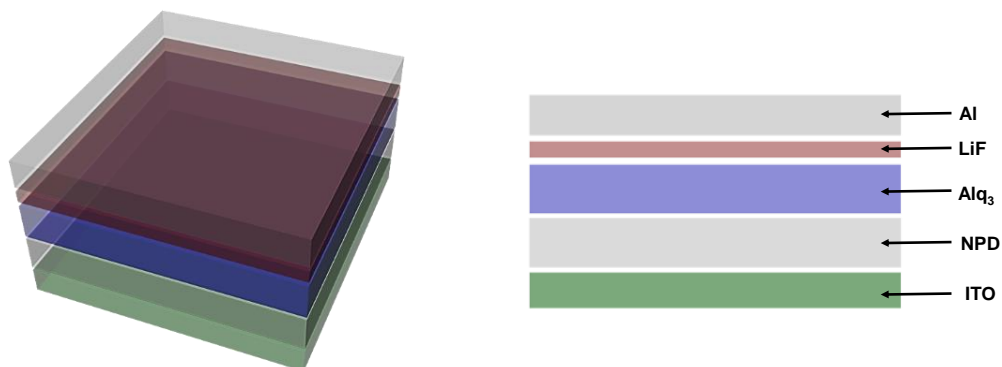


Figure S5. Schematic diagrams showing the structure of the external OLED with aluminum (Al) ~100 nm, LiF~1 nm, tris (8-hydroxyquinoline) aluminum (Alq₃) ~40 nm, 4,4'-bis[N- (1-naphthyl) -N-phenylamino]biphenyl (NPD) ~40 nm and ITO.