Printed Display Electronics Based on Separated Carbon Nanotube Inks

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Motivation & Introduction

Q1: Why choosing separated carbon nanotubes (s-CNTs):
1. Good semiconducting material for thin film transistors:
   - High mobility (10~100 cm²/Vs), high on/off ratio
   - Small operation voltage (1~10 V).
2. Good candidate for printed electronics and flexible electronics.

Q2: Why choosing printing technology:
1. Low cost.
2. High throughput.

Experimental Setups

Printable Ink Engineering

Find proper printable inks for printed thin film transistors (TFTs):
- Conductive electrodes: silver nanoparticle solution.
- Semiconducting material: semiconducting-enriched s-CNT solution.
- Gating material: PEI/LiClO₄.

In Depth Study

Frequency Study

Back Gate:
- f_{3DB} = 93.3 Hz
- Top Gate:
  - f_{3DB} = 5.66 kHz
  - V_{top} = 93.3 Hz

Explaination for Ambipolar Transport

Pixel Driving Circuits

1T OLED Driving Circuit

2T OLED Driving Circuit

Prospect

1. Printed integrated flexible display.
2. Printed, flexible electronics based on thin film transistor circuits, for example, sensor, flash memory and CPU, etc.