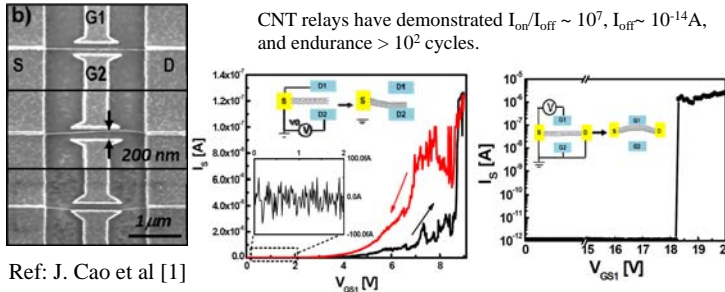
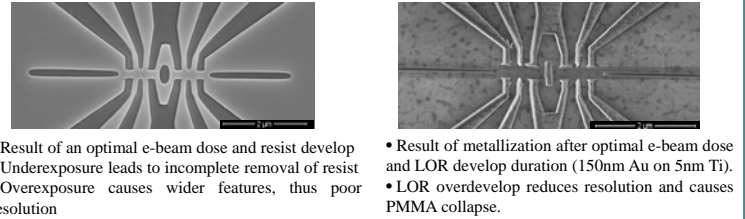


Abstract: Carbon nanotube (CNT) relays are promising NEMS devices due to CNT's low mass, small dimension, high Young's modulus, and high current density. Previously, CNT clamped-clamped relays have been fabricated using a bottom-up integration scheme. This process involves resist-assisted assembly, where single-walled metallic CNTs are self-aligned into electron-beam resist trenches using ac-dielectrophoresis (DEP). These devices have shown excellent ON/OFF current ratios, low off-state current, high yield, and high endurance. Using this same process, we demonstrated a novel six-terminal (6T) CNT relay for low power applications in this work.

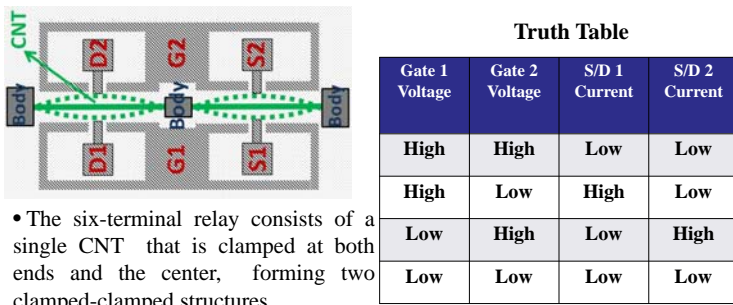
Previous Three-Terminal CNT Relays



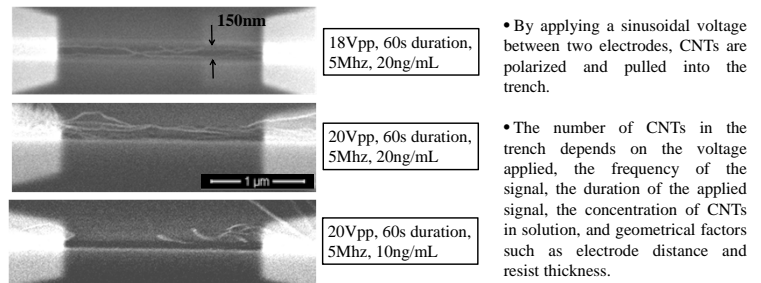
50nm Feature Size



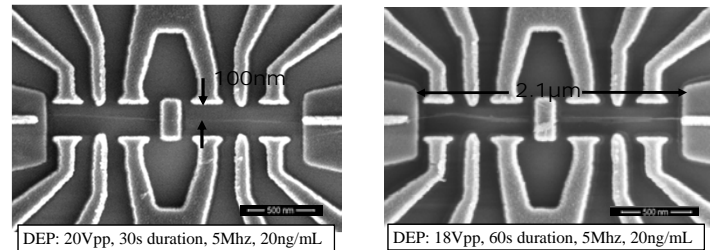
Proposed Six-Terminal Relay



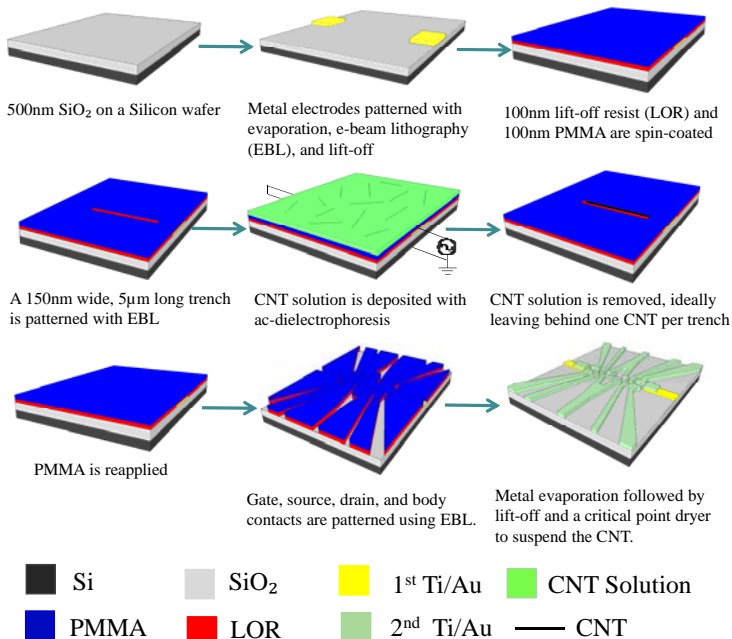
AC-Dielectrophoresis



Final Well-Aligned 6T CNT Relays



Process Flow



Conclusions and Future Work

Six-terminal CNT relays have been demonstrated for the first time. We will further explore their electrical characteristics, such as: on-current, off-current, pull-in voltage, and endurance.

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Support Information
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