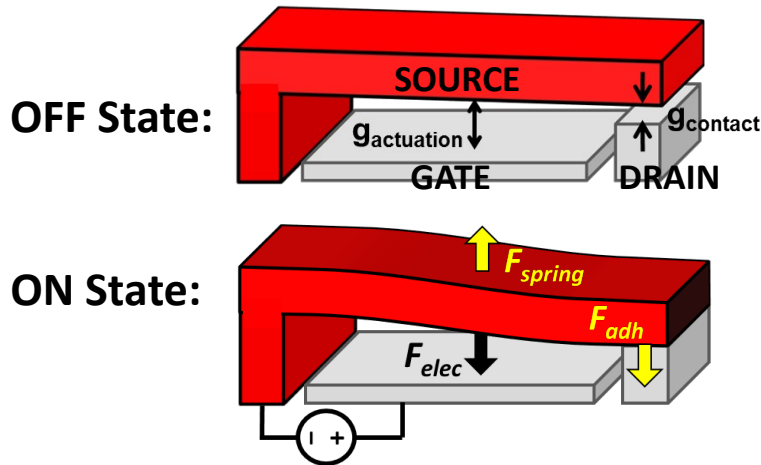


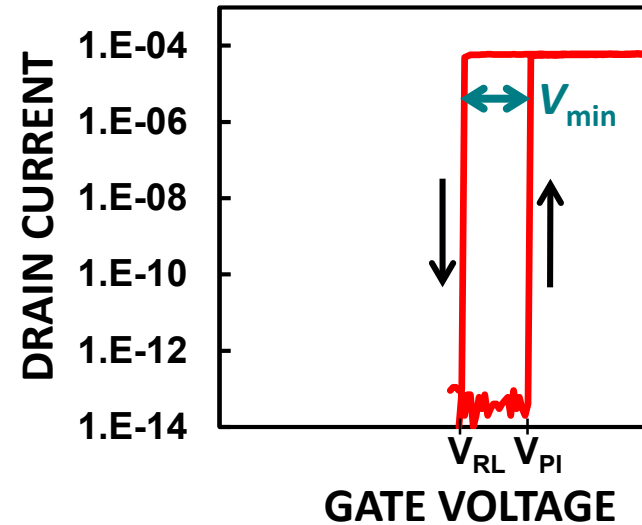
Theme II: Nanomechanics

3-terminal switch



✓ Zero passive energy

Measured I-V

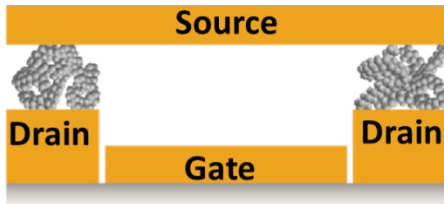


✓ Very low switching energy

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September 7, 2017



Theme II Projects & PIs



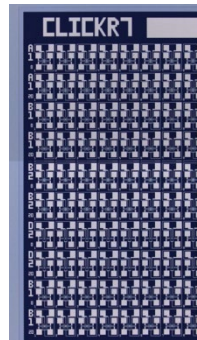
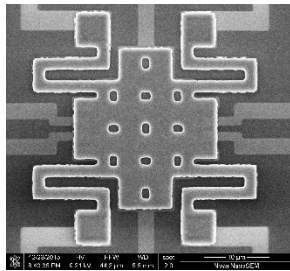
➤ **Squitch [Lang, Bulović, & Swager, MIT]**

– Low-modulus molecular coatings



➤ **Low-Voltage Relay Integrated Circuits [Liu, Wu, Stojanović, UCB]**

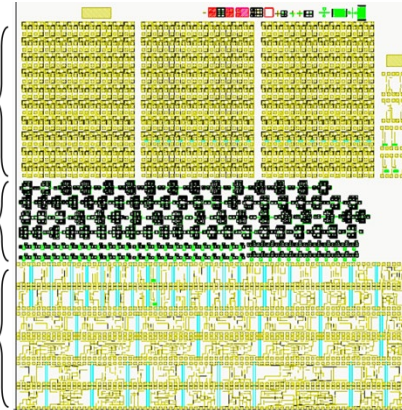
– mV device & circuit demonstrations



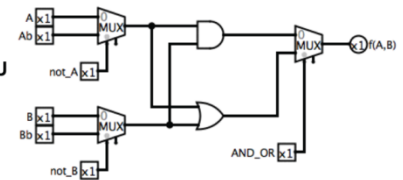
Vertically actuated relays

Laterally actuated relays

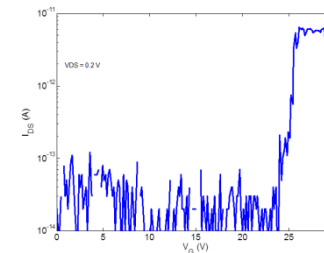
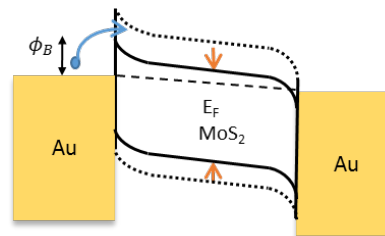
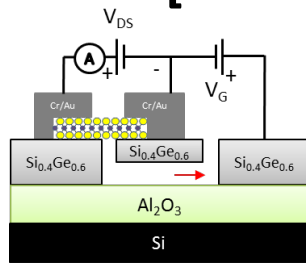
Relay ICs



1-bit ALU



➤ **Stritch [Zubia, UTEP]**



– Strain-induced bandgap modulation in 2-D materials



9/7/17

A Science & Technology Center

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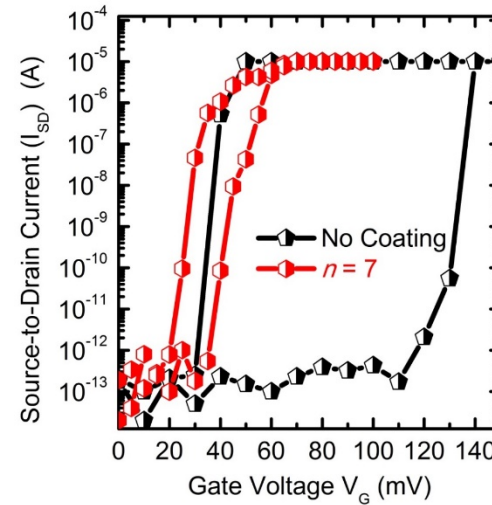
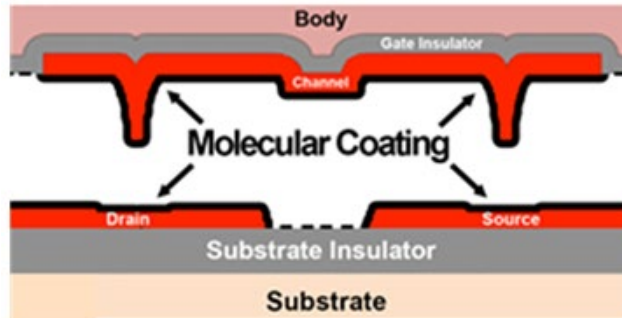
Page 2

Center for Energy Efficient Electronics Science

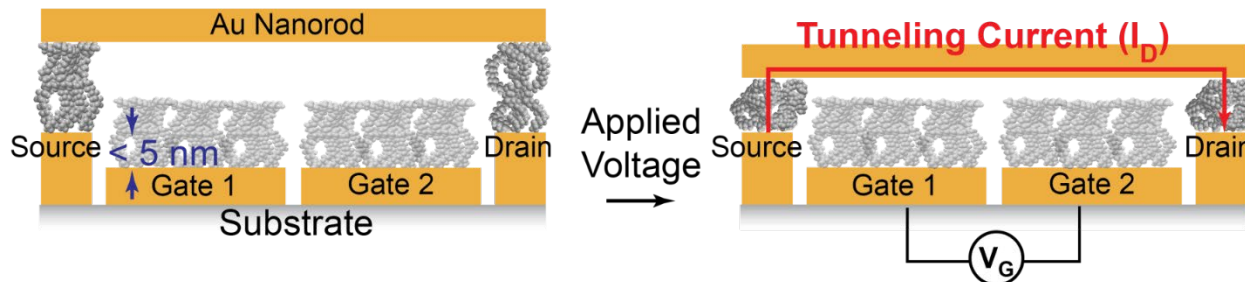


Recent Accomplishments

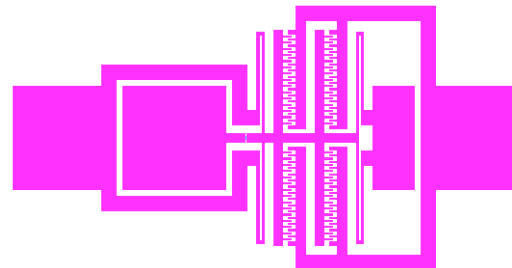
➤ Sub-50 mV relay demonstration



➤ Multi-terminal Squitch



➤ Low-voltage Stritch design



Research Updates

- ❑ Sub-50 mV NEM Switch Devices

Bivas Saha

- ❑ Squitch Design, Fabrication, Metrology

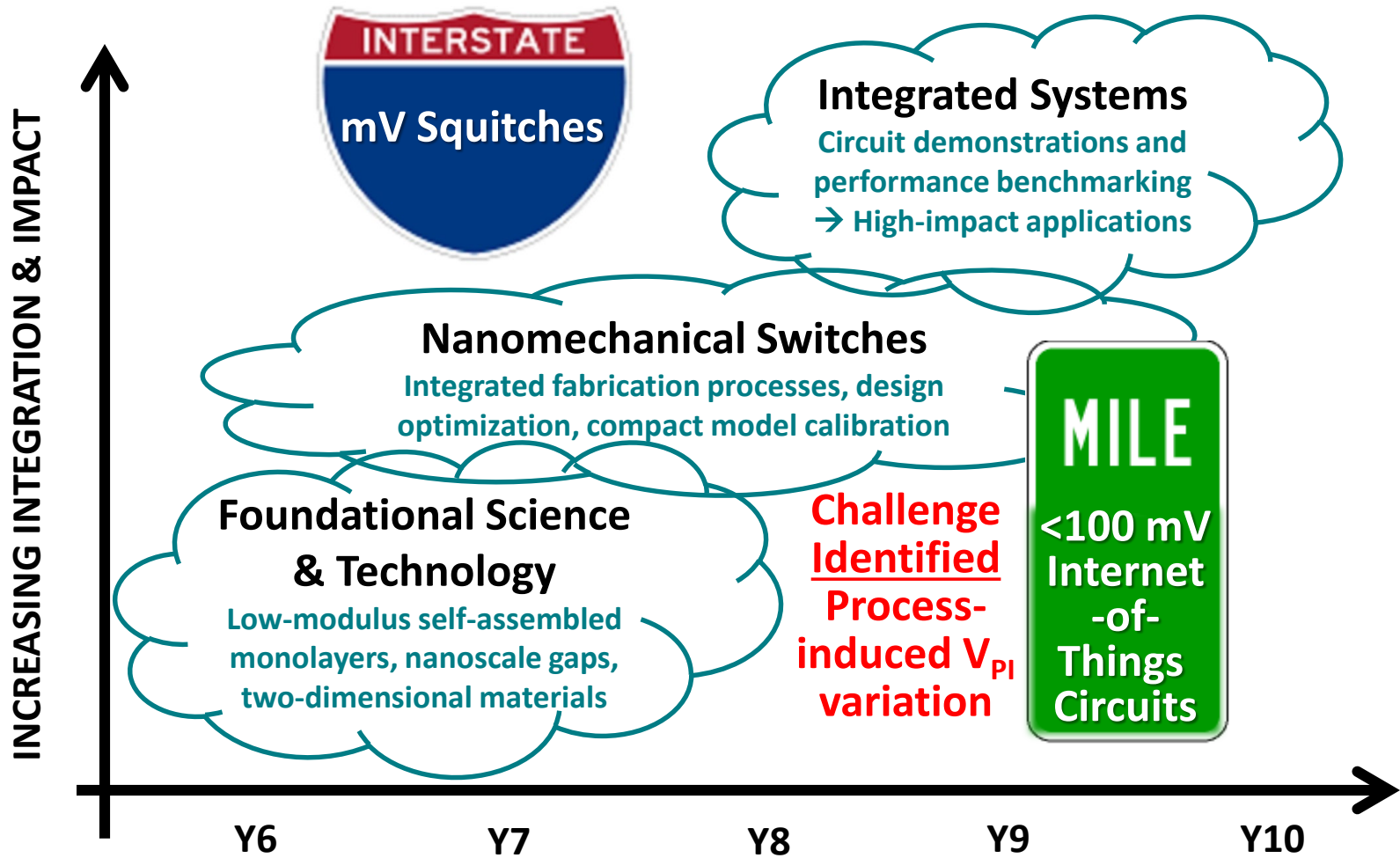
Farnaz Niroui

- ❑ Stritch Research Update

David Zubia



Theme II (Nanomechanics) Roadmap



Theme II Legacy

- **Foundational Science & Technology**
 - ❑ Nanofabrication techniques (sub-1 nm surface roughness)
 - ❑ Nanoscale metrology (plasmonic ruler)
- **NEM Switches**
 - ❑ Sub-10 mV proof-of-concept (enabled by EE+MSE+Chemistry)
 - ❑ Identification of challenges (e.g., molecular coating requirements)
- **Integrated Systems**
 - ❑ Demonstration of sub-100 mV relay-based integrated circuits
 - ❑ Reconfigurable interconnects for CMOS
- **Research technology transfer to UTEP**

