

# MICRO ELECTROMECHANICAL SWITCH DESIGN WITH SELF ALIGNING AND SUB-LITHOGRAPHIC PROPERTIES

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## BRIEF DESCRIPTION

Shrinking of integrated circuit (IC) device dimensions provides for enhanced functionality and performance of computers and electronics. Researchers at Berkeley are exploring nano-mechanical information processing as a means to overcome the energy-efficiency limits of CMOS technology and recently have directed their efforts toward the development of device designs suitable for implementation in the cross-point array architecture for minimal footprint.

To that end, our researchers have designed a novel process for fabricating ultimately scaled electro-mechanical relays with decananometer lateral dimensions. Their innovation includes a compact electro-mechanical switch design which has self-aligned features with a minimum dimension not defined lithographically. By incorporating multiple sets of output electrodes, the area required to implement a complex logic gate is reduced by a factor of 2.

## SUGGESTED USES

- » Ultra low power and low cost ICs
- » Suggested applications include battery-life dependent electronics and displays, safety-critical devices (e.g. medical devices), nanotechnology, power management and energy harvesting applications

## ADVANTAGES

- » Design structure possesses property desirable to overcome hysteresis limitation of contacting mechanical switches
- » Air-gap based mechanical switches have zero sub-threshold leakage current, rendering trade-off between decreasing active energy and increasing leakage energy non-existent
- » Allows logic gate implementation with smaller footprints than equivalent CMOS implementation

## RELATED MATERIALS

- » Publication: Y.-K. Choi, T.-J. King, and C. Hu, "A spacer patterning technology for nanoscale CMOS," IEEE Transactions on Electron Devices, Vol. 49, No. 3, pp. 436-441, 2002.

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## OTHER INFORMATION

### KEYWORDS

integrated circuit, electronics,  
computer, nanotechnology, CMOS,  
EDA, design

### CATEGORIZED AS

- » **Engineering**
- » Engineering
- » **Semiconductors**
- » Design and Fabrication

### RELATED CASES

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