Flexible 1kV thin-film transistor driving out-of-plane dielectric elastomer actuator

Alexis Marette*, Alexandre Poulin, Samuel Rosset, Danick Briand, Herbert Shea

Ecole Polytechnique Fédérale de Lausanne (EPFL) Microsystems for Space Technologies laboratory (LMTS), Rue de la Maladière 71b, CH- 2000 Neuchâtel, Switzerland

Abstract

Dielectric elastomer actuators (DEA) operate at voltage higher than 500V. DEAs devices are usually made of multiple independent actuators and therefore require bulky power supply and circuitry. This problem is solved by designing integrated high-voltage switches.

In this work, we demonstrate the design of flexible high voltage thin-film transistors (HVTFTs) operating as low-control voltage switches to intelligently drive DEAs with one single high-voltage power supply.

Our HVTFT are designed to switch out-of-plane 1kV DEAs

**Fabrication**

1. PDMS blade casting and curing
2. Transfer on PMMA frame
3. C-black electrodes pad printing
4. Transfer on constrainted frame

**Examples**

- Articulated soft-gripper: Tens
- Integrated DEA microfluidic valves: Hundreds
- Flexible Braille displays: Thousands

**What has been achieved?**

- The first 1kV flexible metal-oxide TFT on polyimide
- The first DEA driven with a HVFT

**300µm vertical displacement by TFT switching on 1kV out-of-plane DEA**

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