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

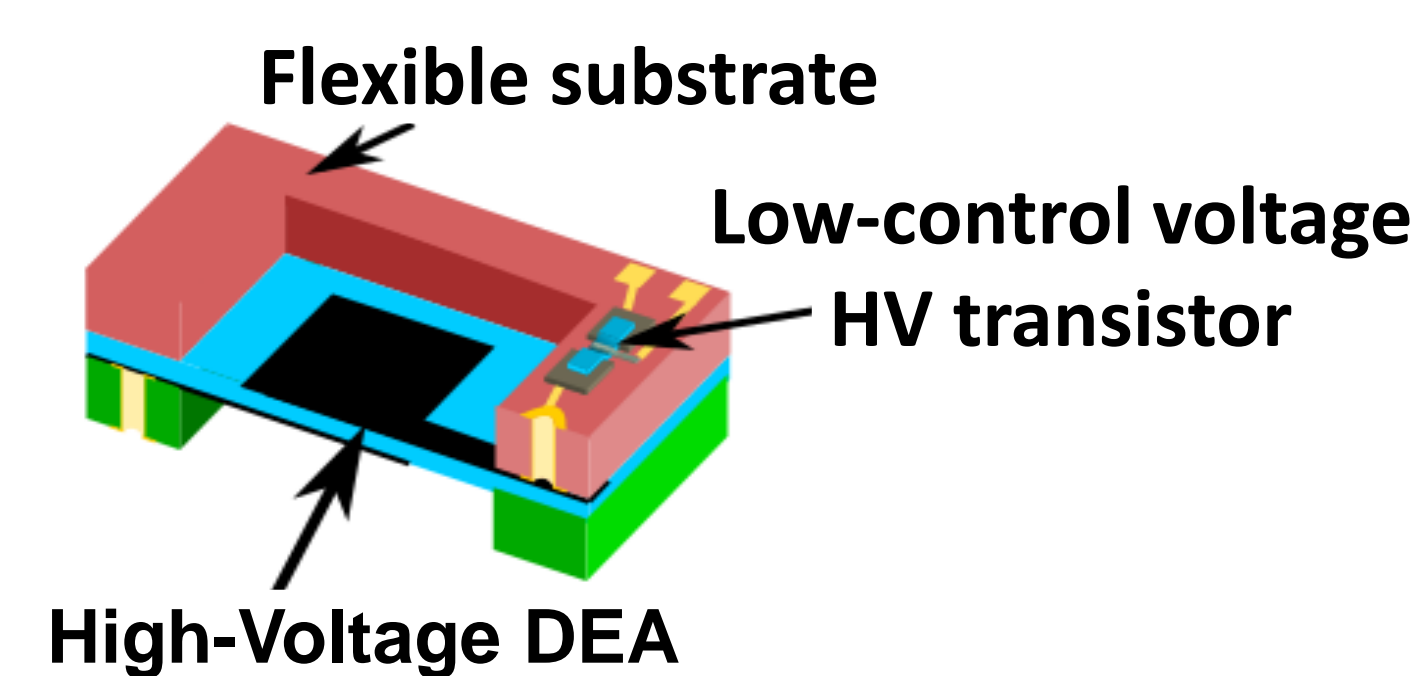
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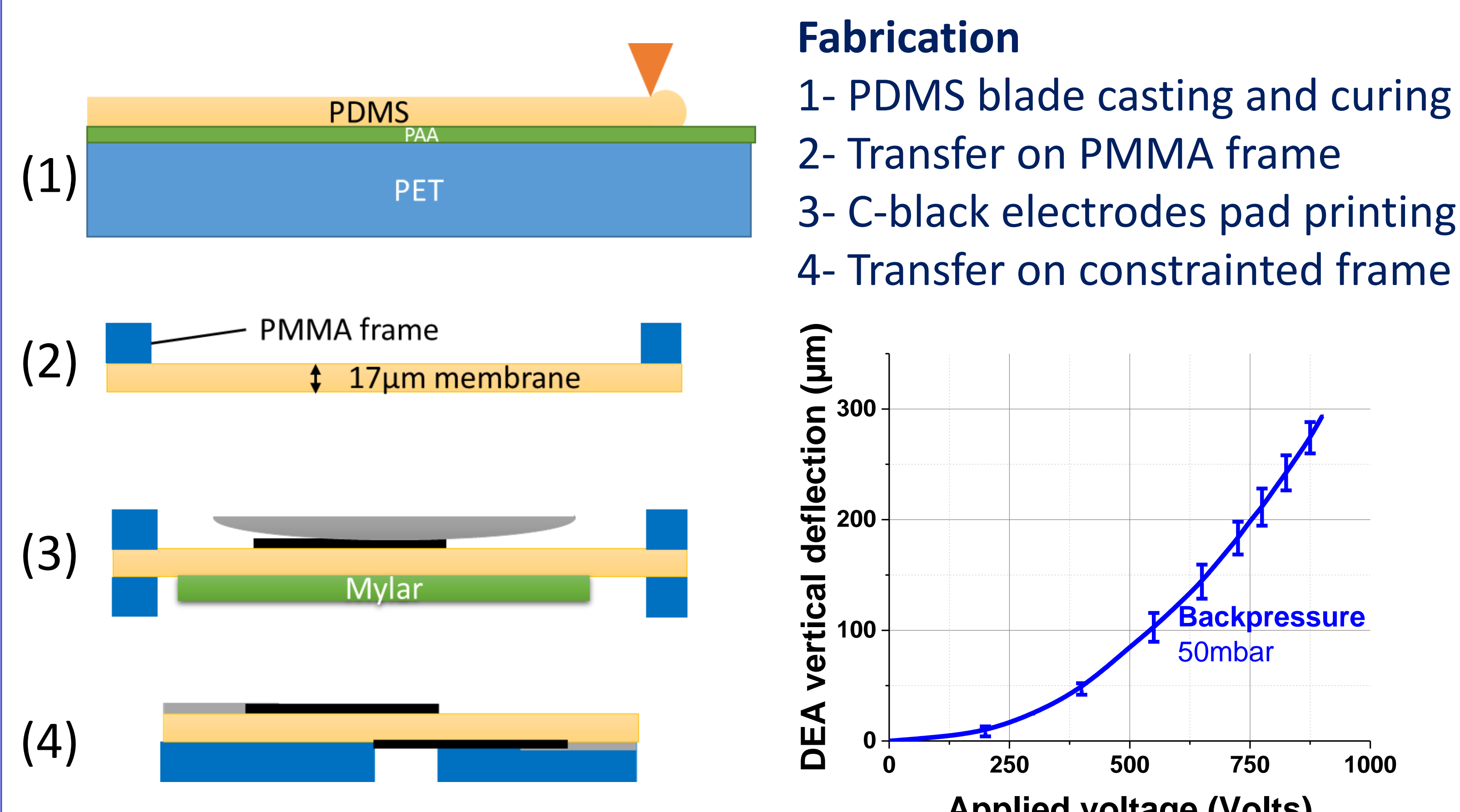
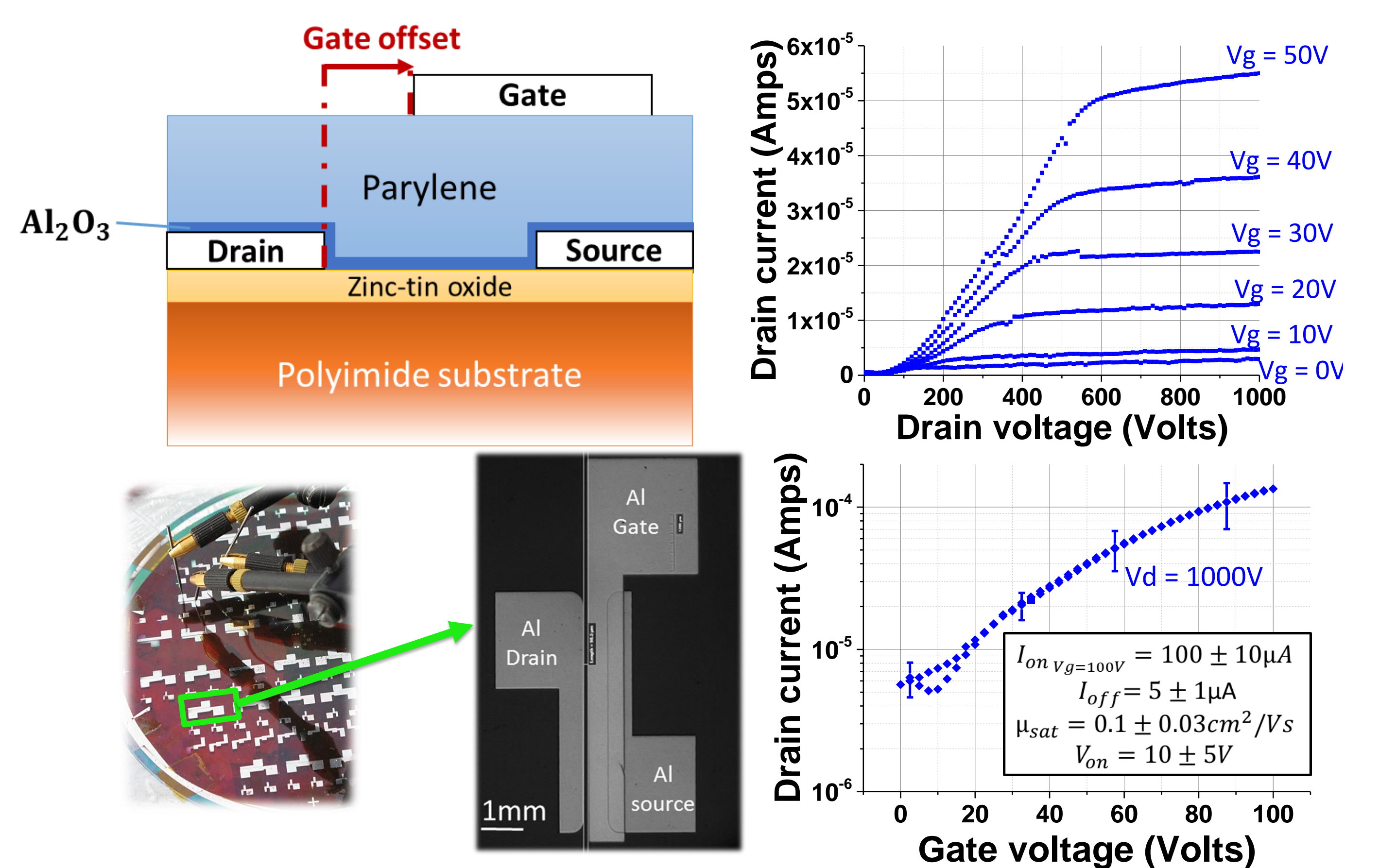
Abstract

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.

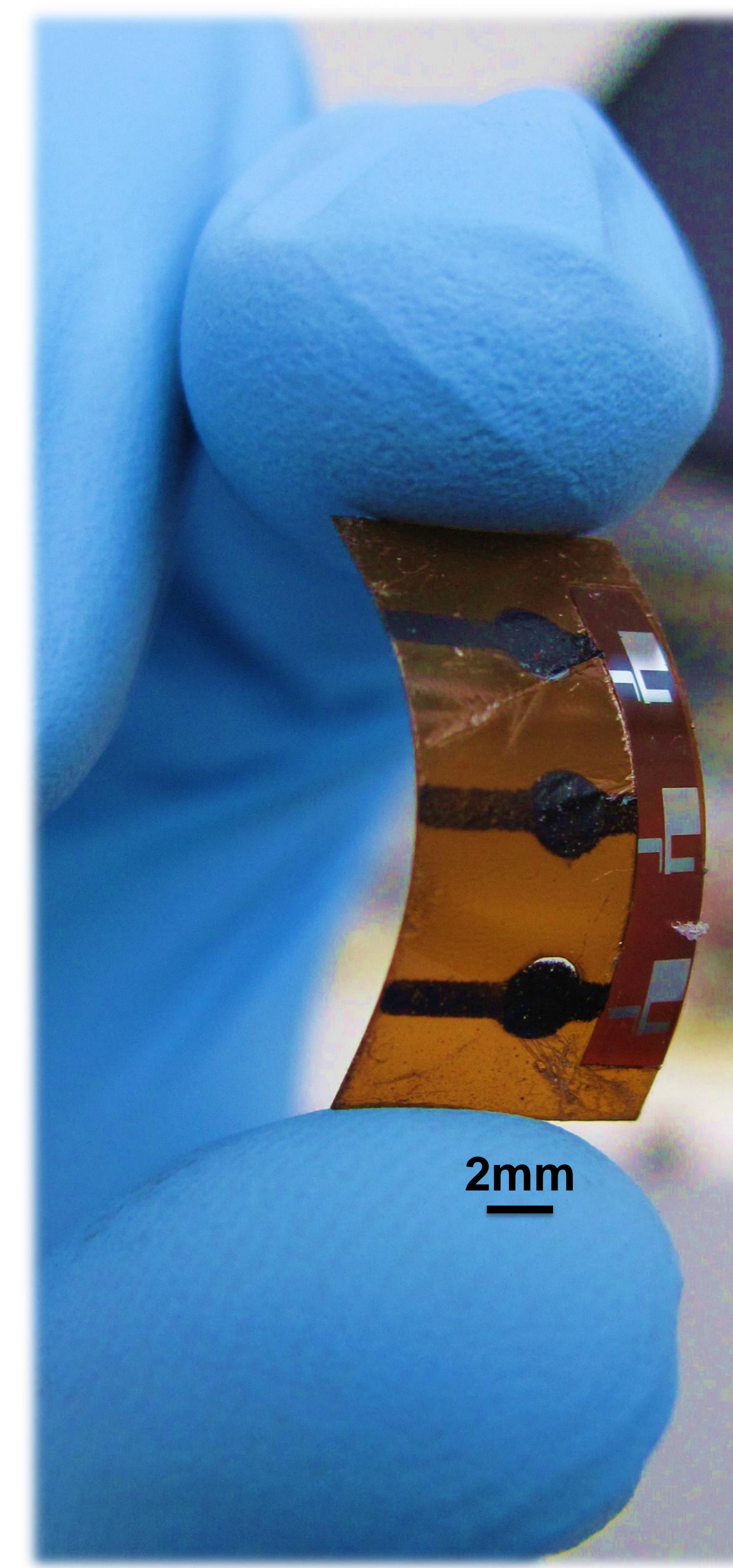
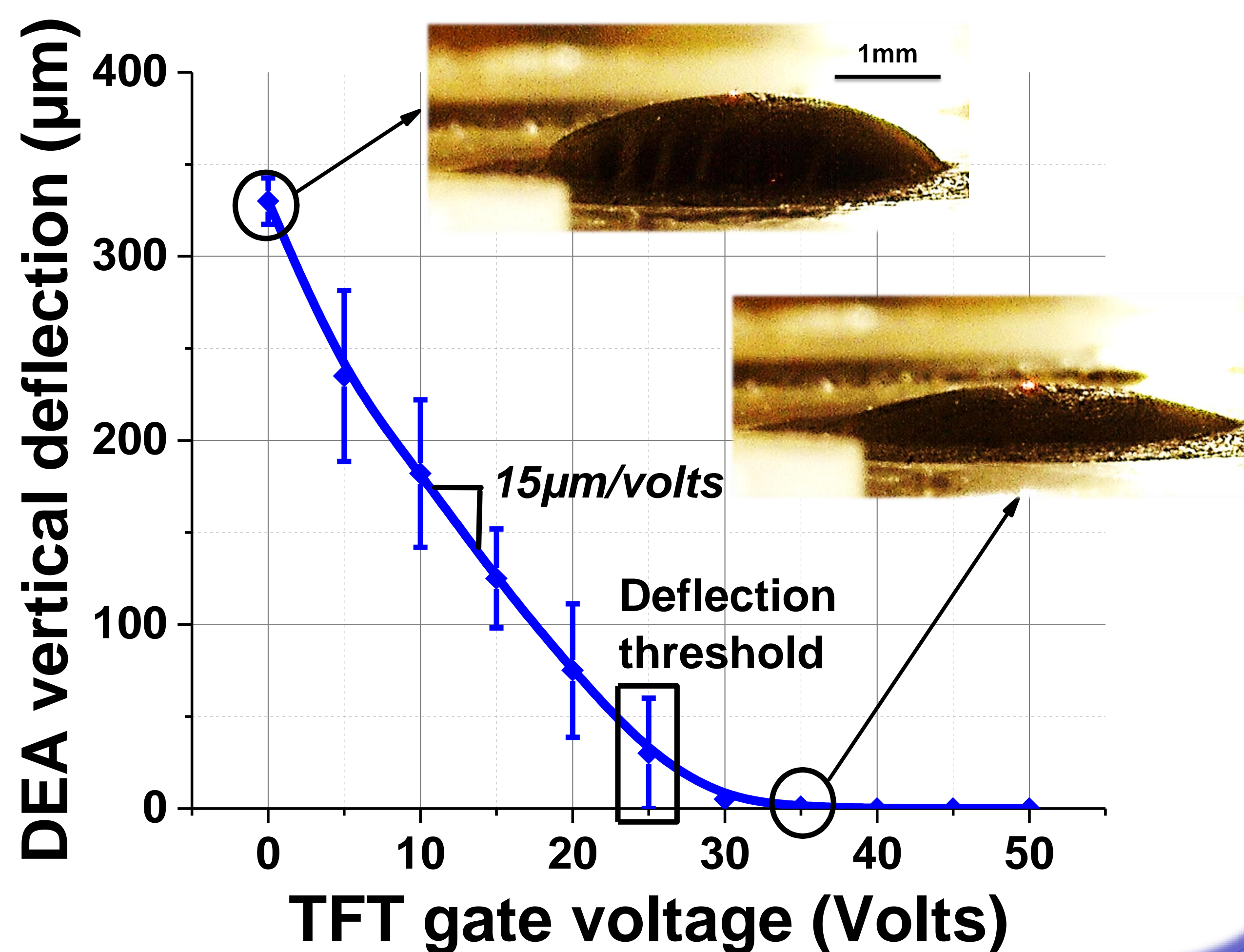
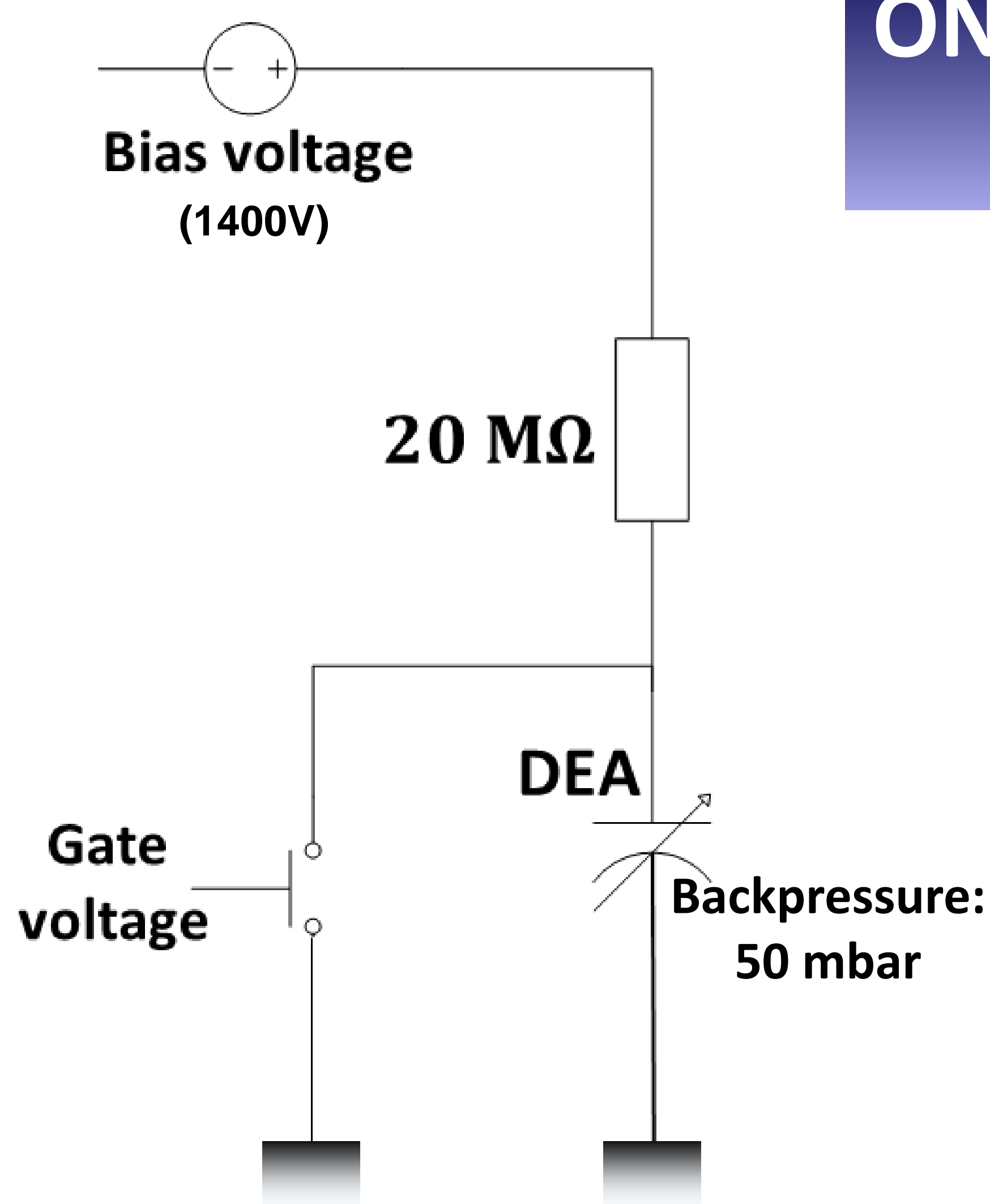
In this work, we demonstrate the design of flexible **high voltage thin-film transistors (HVTFTs)** operating as **low-control voltage switches** to intelligently drive DEAs with **one single high-voltage power supply**.



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



ONLY 25 Volts gate voltage are required to switch a 1000 Volts DEA

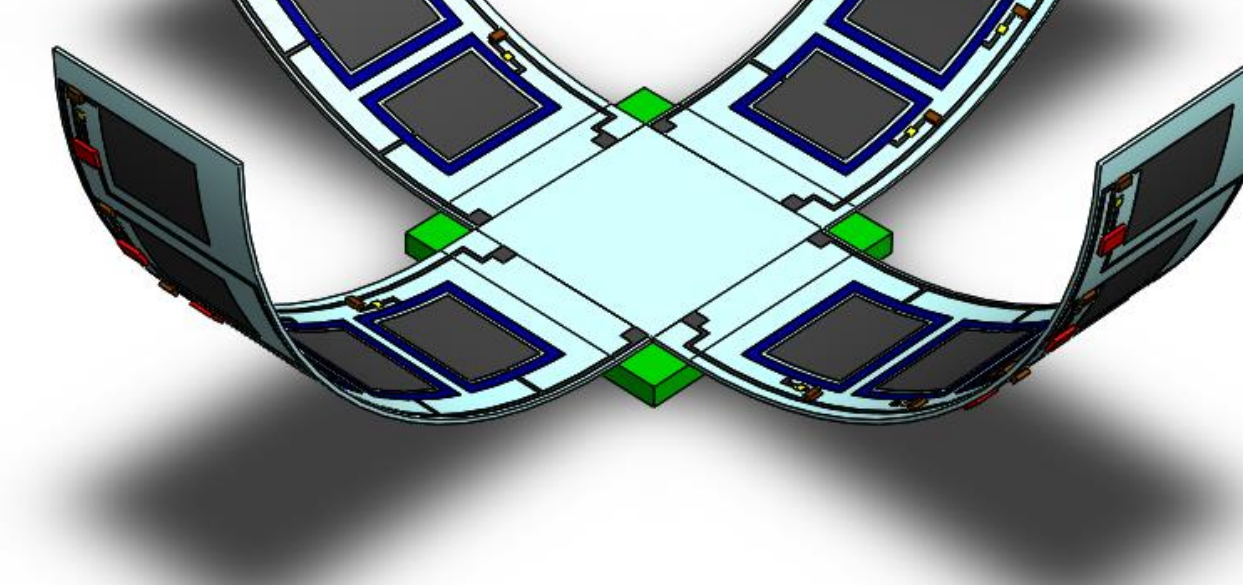


What has been achieved?

- ✓ The first 1kV flexible metal-oxide TFT on polyimide
 - ✓ The first DEA driven with a HVTFT
- 300 μm vertical displacement by TFT switching on 1kV out-of-plane DEA

And in the future?..

Examples of application	# of DEAs + TFTs
Articulated soft-gripper	Tens
Integrated DEA microfluidic valves	Hundreds
Flexible Braille displays	Thousands



Acknowledgments

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