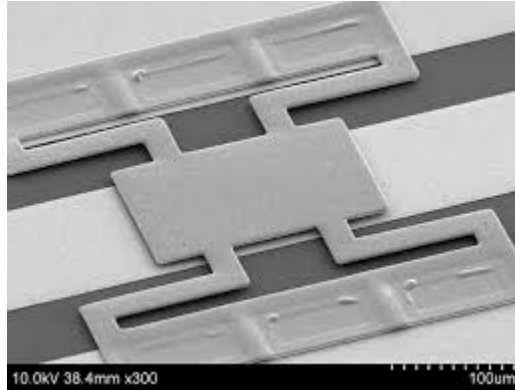


RESISTIVE SWITCH

Resistive switches have been used macroscopically since more than 2 centuries ago. They are also called mechanical relays. The miniaturization of these devices to the nanoscale has been pursued to (1) integrate more switches in the same area, (2) perform faster operation, and (3) gain in long term stability. A typical configuration is a conductive suspended mechanical element on top of a bottom electrode. Electrostatic force will move the suspended element till it closes after a certain voltage.



Within this project you are asked to design and optimize a Resistive Switch. Optimization should be done in terms of the following parameters:

- Fastest response time
- Minimum possible actuation voltage
- Minimum footprint (reduced cost)

This optimization should be done taking into account the following constraints:

- Maximum voltage that we can apply 10 V
- Minimum gap is 200 nm
- Resistance in “ON” state smaller than $10\ \Omega$

Some ideas to check within the project:

- Try different mechanical designs: Cantilevers, Beams, Plates, Membranes,...
- Think of the proper choice of material
- Analyze whether it would be possible or not to have a smaller gap (advantages and disadvantages)
- Build a lumped *nonlinear* model and solve its dynamics via Runge-Kutta