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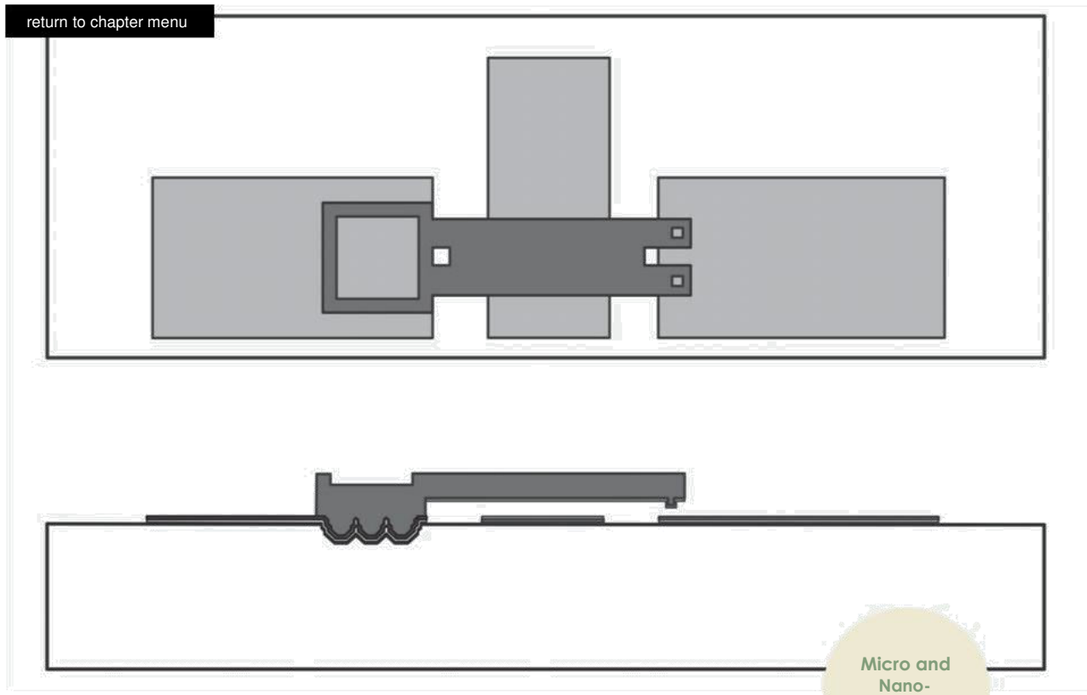
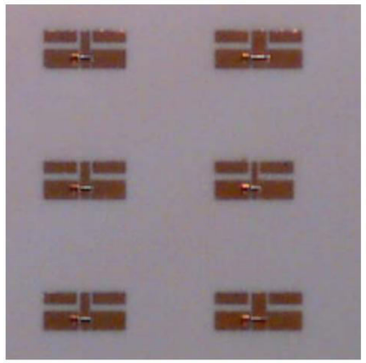
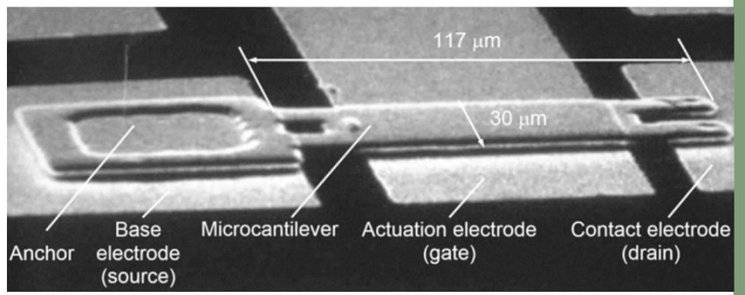


Micro and Nano-technologies

Micromechanical Electrostatic Relay





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[application areas]

Power switching circuitry. The microrelay is operated electrostatically: when voltage is applied to the actuation electrode, the microcantilever is deflected down due to the induced electrostatic force, thus connecting the circuit. This MEMS relay is resistive-type switching device, which could replace conventional electromagnetic relays and solid-state switches in telecom, automotive, automated test equipment and other application areas. Due to compatible fabrication technology, it can be integrated into different microelectronic circuits that require high-frequency commutation of high-power signals.

[year of invention] 2005.

[authors]

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[features, technical specifications]

It is a micro-scale device with lateral dimensions in the range of tens to hundreds of micrometers; thickness of the microcantilever is about 2.0 μm; contact gap is smaller than 1.5 μm.

Specifications

Control voltage: 20÷200 V.

Contact resistance: <1,0 Ohm.

Switching frequency: <100 kHz.

Current capacity: <1,0 A.

[novelty]

In order to strengthen attachment of the microcantilever to the substrate, stepped pyramid-shaped fractal microstructures with high effective surface area formed in the anchor region during fabrication process, which results in improved device reliability.

[technological readiness level]

An experimental miniature device. Not in production.

[patenting]

LR patent No. 5208.

[commercialisation]

Not yet commercialised.

[alternatives]

USA patent No. 6016092, HOI P 1/10, 2000.