

Semiconductor Technology from A to Z

Micromechanics

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Introduction to MEMS

What Is a MEMS?

MEMS (Micro-Electro-Mechanical Systems) refers to devices that combine mechanical and electrical functions on the same chip – sensors that convert motion, pressure, or sound into electrical signals, or actuators that translate electrical signals into motion. Unlike classical integrated circuits, which work exclusively with charge carriers, MEMS contain movable mechanical structures: free-standing beams, membranes, comb structures, or springs that deflect in the nanometer-to-micrometer range.

Fabrication uses the same basic tools as classical semiconductor technology – lithography, etching, deposition – but goes beyond their usual purpose: while every layer in a transistor is meant to stay permanently bonded to the next, MEMS structures must be deliberately released so they can move. This requires additional concepts such as sacrificial layers and deep, highly anisotropic etching, which play no role in classical fabrication.

Applications are everywhere: accelerometers in smartphones (screen rotation), pressure sensors in tire-pressure monitoring systems, microphones in practically every mobile device, and micromirrors in projectors.

Fabrication: Mechanical, Not Just Electrical

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Application Examples

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