cea leti

MEMS

330 PATENTS

Microsensors and microactuators manufactured with microelectronic based technologies

What it is

What are MEMS? MEMS = Micro Electro Mechanical Systems. CEA-Leti, as one of the world's pioneers in MEMS technologies, is constantly pushing the limits of MEMS expertise to stay a step ahead in technology know-how. Today, CEA-Leti offers you extensive capabilities in developing ultrasensitive, multifunctional and robust MEMS & NEMS, designed for integration into your specific products and application fields.

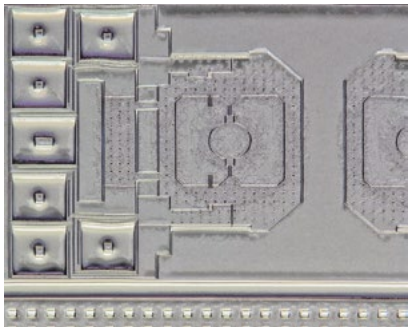
What it can do

- **Consumer**: smartphones, tablets, watches etc.
- **Automotive**: airbags, navigation systems, etc.
- **Aerospace**: RF switches, etc.
- **Industry**: process monitoring (pressure, flow, etc.)
- **Defense**: artillery systems, security triggers
- **Medical**: blood pressure monitoring, analyses methods

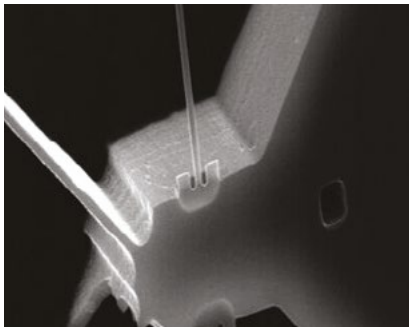
What makes it unique

- The combination of MEMS and nanoscale technology in **generic M&NEMS platform**.
- **Miniaturization** of many types of sensors (ultrasonic transducers, pressure sensors, microphones, etc.) and various transduction modes available (capacitive, piezoresistive, piezoelectric, magnetic, etc.).
- **Piezoelectric actuators** integration with large spectrum of piezoelectric materials (AlN, PZT, doped PZT, etc. with thickness from 200 nm to 2 µm).
- **Lead-free piezoelectric materials**: innovative materials and processes to drive the evolution of piezoelectric devices towards future technologies.
- **Optomechanical sensors** high-efficiency motion detection for extreme sensitivity, ultra-rapid response, and superior integrability.
- **Haptic actuators** using differentiating & innovating piezoelectric technologies (thin-film, flexible patches, transparent).
  Microphones offering state of the art global features: very large dynamic (no saturation) and very high sensitivity (low SNR—crystal clear)
- **MEMS packaging on wafer level**: wafer bonding, thin film packaging, TSV, RDL, etc.

Barometric sensor ▼



Accelerometer nanogage ▼



What's next?

- Improvement of piezoelectric and magnetic materials stacks: **push beyond existing limits**
- Combination of silicon photonic and nano-scale sensing (optomechanical sensors) : **improved resolution for high performance sensors** (AFM, mass spectrometry, biosensing, and oscillators/clocks, etc.)
- Introduction of new materials (2D materials—graphene, MoS2, etc.): **explore the high potential to make new sensors** (bio-sensors, ultrasonic transducers, etc.)
- **Pioneering the future of touch**: conformable and flexible haptic interfaces.

At a glance

- Staff of 100+ developing MEMS (sensors, actuators, RF, packaging, process, characterization)
- All 8" MEMS technologies in-house
- Portfolio of 330 MEMS patents
- 30 new patents every year
- 20+ ongoing industrial collaborations
- 7 startups created in MEMS technologies

40 years of MEMS experience

- **1984**: World's first comb drive patent
- **1996**: CEA-Leti spins out Tronics, a full-service MEMS manufacturer
- **2015**: CEA-Leti reinforces pioneering position by manufacturing the world's first MEMS on 12" wafers
- **2025**: iNGage SAS startup creation offering high performance M&NEMS technology platform

Interested in this technology?

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Research for industrial innovation