INO
CHALLENGING LIGHT
FOR OUR PARTNERS

MEMS/MOEMS FOUNDRY SERVICES

INO has fully equipped cleanroom and environmental facilities and established processes which it uses to develop MEMS/MOEMS devices for its partners. The following are some examples:

STANDARD PACKAGING AND MICROPACAGING

INO has developed a variety of packaging techniques, including standard hermetic and vacuum packaging and micropackaging, which are used for its own uncooled bolometric detectors and MOEMS devices. Our patented wafer-level micropackaging technique, now available for licensing to an industrial partner, makes it possible to package MEMS/MOEMS devices in cavities smaller than the die itself.

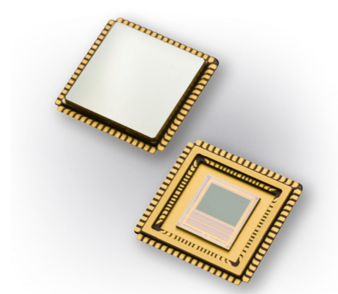
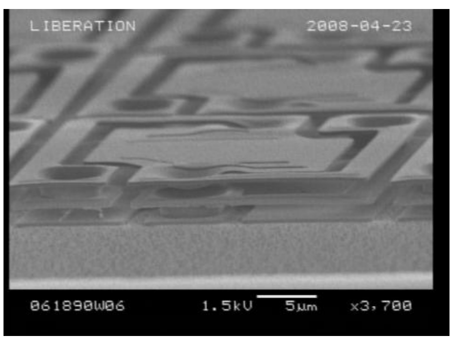


Photo IRM160A

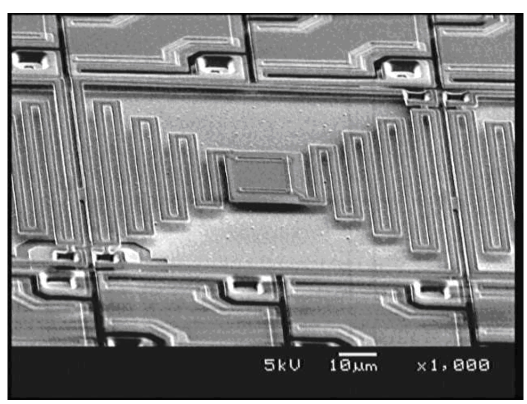
UNCOOLED MICROBOLOMETER DETECTORS AND FOCAL PLANE ARRAYS



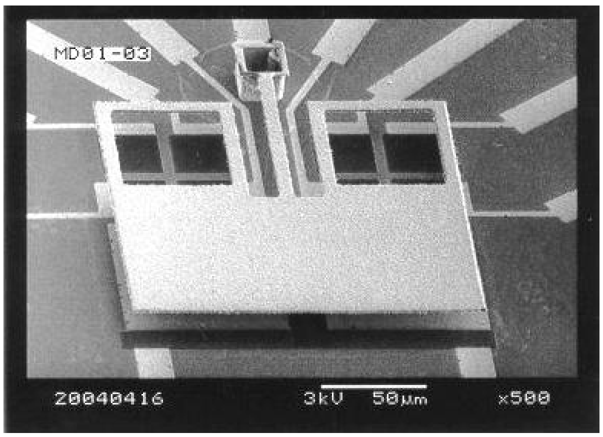
Microbolometer FPAs find a vast range of applications in which optical radiation must be sensed over a wavelength region that may extend from the visible through the infrared and as far as the terahertz (THz) spectral region. Microbolometer pixels are typically fabricated monolithically over CMOS ROICs using surface micromachining processes. Each detector pixel is made up of dielectric structural and absorbing layers and a layer of semiconductor material having a high thermal coefficient of resistance.

MICRO-PIRANI PRESSURE SENSOR

INO's pressure microsensor has applications in general vacuum control, for vacuum pressure measurements in the semiconductor and coating industries, as well as for integration in various pressure control systems. Pressure can be measured over a range of 3 mTorr to 760 Torr with a typical relative accuracy down to ±2%.



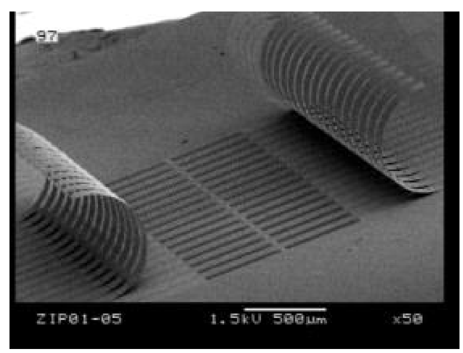
MICROMIRRORS



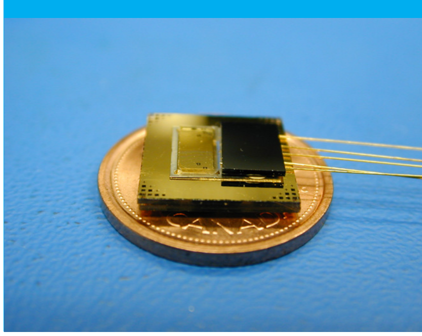
INO designs, fabricates and tests MEMS micromirrors for diverse applications. Bulk and surface micromachining are the main techniques for fabricating, for example, the illustrated photodiode-assisted closed-loop light beam micromanipulator. INO has also developed an approach for fabricating "giant" actuated micromirrors having reflecting surface areas up to 1000x1000 mm2 using a combination of selective electroplating and flipchip technologies. Another example is a DVI-compatible VGA projector engine based on a flexible reflective analog modulator (FRAM) array, wherein each microbridge acts as a flexible micromirror whose curvature is controlled through electrostatic actuation.

PROGRAMMABLE MICROSLIT ARRAY FABRICATED WITH "ZIPPING" ACTUATORS

INO's microfabrication facilities allow for the application of controlled mechanical stress during thin film deposition. The combination of this capability with surface micromachining technology was used for the fabrication of an addressable microshutter array for an infrared miniature guided-wave spectrometer based on the proprietary IOSPEC technology of MPB Communications. The slits are controlled individually via a microshutter based on an electrostatic "zipping" actuator.



3-D INTEGRATION OF MICRODEVICES



INO has been developing technologies for the precise alignment and stacking of microdevices. These technologies support, for example, the microintegration of source, free space or liquid sampling channels, and detector. Illustrated is a 5x5 optical fiber input/output coupler featuring precise fiber alignment and integrated micro-optics.