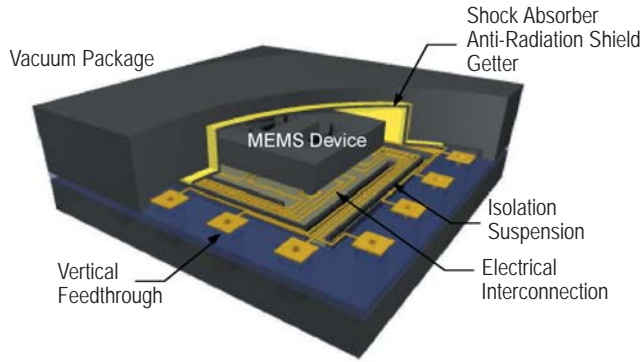


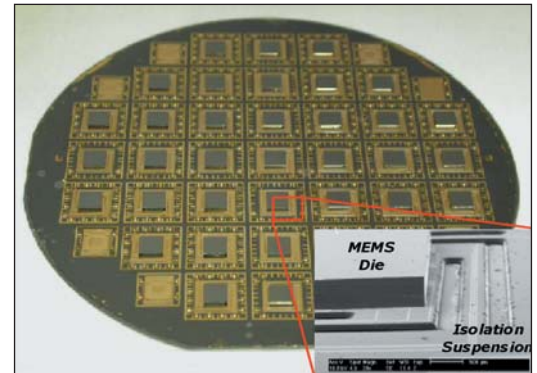
# A Generic Packaging Technology to Protect Microsystems From Harsh Environments

Sang-Hyun Lee, Sang Woo Lee, and Khalil Najafi

To improve the performance of sensors, harmful environmental effects must be eliminated. A new generic microsystem packaging technology comprising thermal and vibration isolation, as well as vacuum/hermetic encapsulation, has been developed. Microsystems containing sensors can be mounted on top of an isolation platform fabricated from 100 $\mu\text{m}$ -thick glass. The platform is supported and suspended using 100 $\mu\text{m}$ -thick glass tethers, which provide excellent thermal isolation and mechanical support. Using a temperature sensor and heater, the microsystem is maintained at constant temperature with minimal power. Vertical feedthroughs transfer signals to and from the microsystem. All manner of devices can be transferred to the platform at the die or wafer level using a generic process. In addition to the isolation platform, the technology comprises vacuum encapsulation. Vacuum pressures as low as 30mTorr have been achieved, and a micromachined gyroscope has been integrated into the packaging technology as well. ■



**Schematic view of the package, showing the protected microsystem sensor, in this instance, a MEMS device.**



**Sensor dice batch transferred onto glass isolation platforms (before vacuum encapsulation).**