MEMS Foundry Service at Matsushita Electric Works

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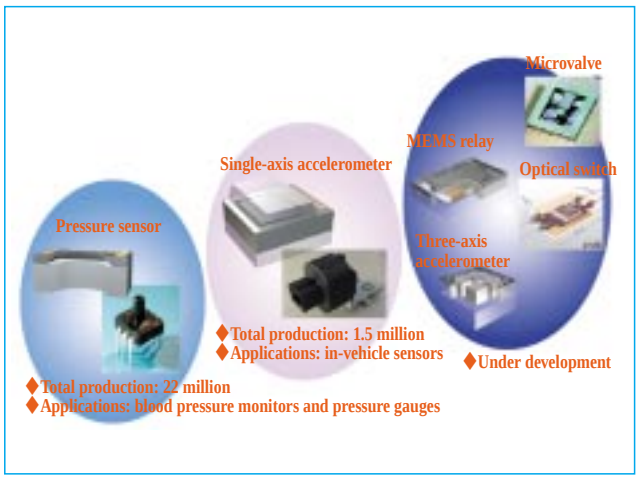
1. Outline

Since 1981, Matsushita Electric Works (MEW) has developed and accumulated knowledge in technologies involving semiconductor devices, such as relay devices, for in-house applications. From the mid-1990s, the company began developing MEMS devices in earnest, including pressure sensors and accelerometers, and later put its in-house facilities to use by launching the MEMS foundry service in 2002. MEW offers a wide range of services from wafer processing, using bulk micromachining techniques (a micromachining technology for producing complex 3D structures through Deep-RIE on silicon substrates and wafer bonding) accumulated through in-house development of MEMS products, to packaging. Through its rich experience in mass-producing MEMS sensors, the company can provide total solutions from prototyping to mass-production.

2. MEMS Technology at Matsushita Electric Works

For many years now, MEW has developed and commercialized various MEMS products with a focus on bulk micromachined MEMS sensors. Applying anisotropic etching of silicon, developed through processing semiconductor relays, MEW has used piezoresistive pressure sensors in such consumer products as blood pressure monitors, and has employed single-axis accelerometers of the same piezoresistive type for automotive uses. To date, the company has also developed three-axis accelerometers, and actuators used for MEMS optical switches, MEMS relays, and microvalves.



MEMS development at Matsushita Electric Works

Owing to this development, MEW developed a vertical silicon etching technique using Deep RIE for forming through-holes and micropatterns in wafers and achieving high aspect ratios, and silicon-on-insulator (SOI) bulk micromachining techniques for performing precision processing on a submicron order using SOI wafers formed by wafer bonding. These technologies enable the fabrication of smaller devices with higher performance.

3. Features of the Foundry Service

MEW's foundry service performs a wide range of services from single-wafer processes to device fabrication and packaging. In addition to the technologies described above, the foundry can produce various 3D structures by combining nanopatterning with a semiconductor stepper, glass substrates processing, and bonding steps. MEW also possesses a packaging technology fostered through the development of various in-house devices and can offer services applying a micropackaging technology using molded interconnect devices (MID; a technology to manufacture 3D electric circuits directly on injection molded boards).

MEW possesses fabrication and quality assurance knowledge founded on a wealth of experience from development to mass-production of in-house products. Based on this know-how, the foundry offers services from design and small-quantity prototype fabrication to design studies for mass-production and actual mass-production.

MEW can perform services from development and prototype production to small-quantity production on its 4-inch line at the Advanced MEMS Development Center, located at the Kadoma headquarters in Osaka, and possesses a 6-inch line for mass-production at its Ise Plant in Mie Prefecture.

4. Conclusion

In addition to using its MEMS processing technologies developed and accumulated thus far for in-house products, MEW also hopes to accelerate the practical use and applications of MEMS by extensively providing these technologies to users trying to develop MEMS businesses.

Through assistance from NEDO, MEW is participating in the MEMS Project, a three-year endeavor that began in 2003, developing new MEMS processing technologies. The company aims to further develop and expand its foundry services in the future.