

Fraunhofer Institute Reliability and Microintegration
Branchlab Chemnitz
Department: Micro Devices and Equipment



Director: Prof. Thomas Gessner Management: Prof. Thomas Otto

Since 1998 a strong co-operation exists between the Fraunhofer Institute for Reliability and Microintegration (FhG-IZM, Berlin) and the Center for Microtechnologies. Accordingly the department “Micro Devices and Equipment” (MDE) was founded to combine the packaging know-how of the FhG-IZM with the silicon MEMS devices of the Center for Microtechnologies.

The research activities of the department MDE are focused on the following topics:

- *Development of MEMS:* Sensors (kinetic, pressure, force, chemical) and actuators (scanner) are transferred into the system level (e.g. micro spectrometer).
- *Development of advanced technologies* like CMP (chemical mechanical polishing) and 3D-patterning by deep silicon etching as well as increasing the core competence in *MEMS packaging* (chip and wafer bonding including combinations of new materials and bonding at low temperatures)
- *Process and equipment simulation:* The goal is the improvement of deposition and etch rates, uniformity and fill behavior of vias and trenches by optimizing process conditions and reactor design.
- *MEMS design and simulation:*
 - New reduced order modelling features of MEMS provide efficient means for data exchange from component models to circuit and system simulation environment.
 - Novel frequency selective vibration sensor arrays have been successfully integrated into a user programmable vibration measurement unit for wear state monitoring.

One special task of the new assembly technologies development is the combination of silicon micromechanics with down scaled traditional precision mechanics enabling new devices and new low cost fabrication technologies. This is a main challenge in order to push the activities concerning the development and implementation of microsystems for small and medium size enterprises in a short-term period.

In general the strategic alliance between the Fraunhofer Institute for Reliability and Microintegration, department MDE and the Center for Microtechnologies as described ensures strong synergies in the technology and device development.