

2 Organization

Center for Microtechnologies

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Prof. Dr. Thomas Gessner

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Prof. Dr. Christian Radehaus

Our scientific research focuses on microsystem technology, microelectronics, as well as opto-electronics and integrated optics. In these fields, the Chemnitz University of Technology has had a tradition and experience of more than 30 years.

The research comprises ULSI metallization technologies, fabrication and application of micromechanical components, modeling, simulation and design of processes, devices, components, circuits and test structures down to the nanometer range, as well as single electron tunneling technologies, nonlinear photonic materials and fiber optics.

In education, the specified and related topics are taught in the basic and main courses. The institute offers the specializations Electronics/Microelectronics, Microsystem/Device Technology and Mechatronics.

The equipment is provided for the institute in combination with the Center for Microtechnologies and comprises a complete silicon wafer line, mask making equipment, commercial software and hardware for simulation and design, as well as extensive analysis and semiconductor measurement technology.

The Center for Microtechnologies facilities include 1000 m² of clean rooms (about 30 % of them class 10 to 100) with equipment for mask and wafer processes.

Visit our homepage: <http://www.zfm.tu-chemnitz.de>

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3 Memberships

Prof. Wolfram Dötzel

Vice President for Research of Chemnitz University of Technology, since October 2003
Member of the Academy of Science of Saxony, Leipzig / Germany
Member of acatech (Council of Technical Sciences of the Union of German Academies of Sciences and Humanities)
Gesellschaft für Mikroelektronik und Mikrotechnik (VDI/VDE-GMM)
ESPRIT III – Network „NEXUS“

Prof. Gunter Ebest

Vertrauensdozent „Studienstiftung des Deutschen Volkes“

Prof. Thomas Gessner

Member of „Scientific Advisory Board of the Federal Republic of Germany“ (01.02.1998-31.01.2004)
Member of the Academy of Science of Saxony, Leipzig / Germany
Member of acatech (Council of Technical Sciences of the Union of German Academies of Sciences and Humanities)
Member of “Senatsausschuss Evaluierung der Wissenschaftsgemeinschaft Gottfried Wilhelm Leibnitz” (WGL)
Member of the Board of „KoWi“, Service Partner for European R&D funding, Brussels
The Institute of Electrical and Electronics Engineers, Inc. (IEEE) , USA
The Electrochemical Society, USA
„Advisory Professor“ of FUDAN University: honorary professor, 1st June 1999
„Advisory Professor“ of Chongqing University: honorary professor, 1st July 2003
Referee of the German Science Foundation (DFG-Fachgutachter) „Systemtechnik“

Prof. Josef Lutz

International Steering Committee of the European Power Electronics and Drives Association (EPE), Brussels
Member of the Advisory Board of the Power Conversion Intelligent Motion Conference (PCIM), Nuremberg
International programme committee of the International Seminar on Power Semiconductors (ISPS), Prague

Prof. Dietmar Müller

Member of the Academy of Science of Saxony, Leipzig / Germany
Member of acatech (Council of Technical Sciences of the Union of German Academies of Sciences and Humanities)

Prof. Christian Radehaus

Optical Society of America (OSA)
The Institute of Electrical and Electronics Engineers, Inc. (IEEE), USA
The American Physical Society (APS)
Deutsche Physikalische Gesellschaft (DPG)

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.