and single electron devices, nanocluster storage elements, and resonant tunneling elements, among others.
There is a new generation of novel components based on the transfer of individual electrons in nanoscale structures. Work centers on memory elements based on the transfer of individual electrons between metal electrodes and on the memory effect of semiconductor nanoclusters in SiO_2 films.

Head of the Working Group: Prof. Dr. Christian Radehaus
Chemnitz University of Technology

4 Research activities of ZfM in cooperation with the FhG-IZM-branchlab Chemnitz

Fields of research

- Design and fabrication of microelectronical and micromechanical elements and arrays
- ULSI metallization
- High temperature stable metallization
- Analysis of micromechanical systems
- Development and application of design tools and methods for micromechanical components and systems & coupled field analysis
- Experimental analysis of microsystems
- Analysis of different interferences on micromechanical systems, reduction or compensation of these interferences
- Coupling of microsystems and instrumentation (mechanical, electrical, thermal and substantial interfaces)
- Function, principles and modelling of electronic devices (test structures, parameter extraction, model building)
- Microelectronic circuit design (read out- and controlling circuits for sensors and actuators)
- MIS – solar cells (manufacturing, analysis, measuring and modelling) & multicristalline solar cells
- Electronics for micro-electromechanical systems (MEMS)
- Design of reusable modules
- Development of infrared measurement systems
- Nanoelectronics
- Integrated Optics
- Colour measurement

Subjects of research

- Microfabricated scanner arrays
- Electostatically driven torsion actuators with one or two DOF
- High temperature applications of MEMS, e.g. gas sensor for exhaust measurement
- Vibration monitoring based on Si-sensor arrays
- Sensor / actuator systems for high precision scanning with a large vertical range
- Transportation systems by using MEMS-actuators

- Gyroscopes
- Simulation of micromechanical and microelectronical components, materials databases
- Design tools for microsystems and microelectronics
- Macromodels for simulation of micromechanical components using PSpice
- Design and fabrication of integrated optical waveguides on silicon
- Fiber-optical communication systems
- Single Electron Tunnelling Technologies
- Colour measurement and sensors
- Orientation dependent etching of silicon: Development of etchants and determination of etch rates, design of etch masks and simulation of etch process, development of new structures by multi-step etch processes
- Geometrical measurement on microstructures
- Plastic deformation of silicon-microstructures
- Copper metallization
- Low k dielectrics
- Equipment and process simulation for microelectronics
- Development of probing equipment for 1/f measurements
- Microwave Device and Circuit Design and Simulation
- Reliability analyses

4.1 Current research projects

BMBF Project „Verbesserung der Performance von Ics durch Integration von Kupfer und low-k Dielektrika - PERFECT“

Project Manager:	Prof. T. Gessner
Project Leader:	Chemnitz University of Technology
Partners:	Infineon Technologies AG Munich, DaimlerChrysler AG Ulm, Dresden University of Technology, University of Hannover
Project duration:	01.11.2000 - 28.02.2004
Project goal:	Application of Copper interconnects for mobile communication IC´s, power devices and micrometer wave devices; Integration of organic low k dielectrics into Copper Damascene metallization

BMBF Project „Herstellung und Charakterisierung ultra-dünner nanostrukturierter Diffusionsbarrieren auf Tantal- und Wolfram-Basis für Metallisierungen in der <0.15 µm Technologie - Ultradünne Barrieren“

Project Leader:	AMD Saxony LLC & Co KG, Dresden
Partners:	Dresden University of Technology, Leibnitz-Institut für Festkörper- und Werkstoffforschung Dresden
Subproject TUC:	Diffusionsbarrieren auf Wolfram-Basis (tungsten based diffusion barriers)
Project Manager:	Prof. T. Gessner / Dr. S. E. Schulz
Project duration:	01.08.2000 - 31.12.2003
Project goal:	Process development and characterization of ultrathin diffusion barriers