

- Gyroscopes
- Simulation of micromechanical and microelectronic 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

BMBF Project „IPQ (IP Qualification)“

Project Manager: Prof. D. Müller
Project duration: 01.07.2001 - 31.03.2004
Project goal: The methodologies and tools developed in the project IPQ are targeted on significant improvements in quality assurance in the development and application of Intellectual Property (IP). This includes the development of new methods for IP specification, intelligent IP retrieval, techniques for (semi)automatic IP adaptation as well as contributions to IP standardisation activities.

BMW Projekt „Optimization of the multicrystalline solar cell process by means of RTP and RIE“

Project manager: Prof. G. Ebest
Partners: RWE Schott Solar, Alzenau
Project duration: 01. 04. 2001 – 31. 03. 2004
Project goal: Proof of rapid thermal processing and reactive ion etching for solar cell fabrication

BMBF Project „Electronic compensation of fabrication tolerances of microsystem products demonstrated for a multi sensor for navigation (EKOFEM)“

Project Manager: Prof. T. Gessner
Partners: LITEF GmbH Freiburg, GEMAC mbh Chemnitz, FhG IZM, Department Chemnitz
Project duration: 01. 10. 2001 – 31. 12. 2004
Project goal: Development of electronic compensation methods of fabrication tolerances and their application for a high precision silicon multisensor (acceleration and angular rate measurement)

SMWA Project „Spectral tunable infrared sensor“

Project Manager: Prof. T. Gessner
Partners: InfraTec GmbH Dresden, FhG IZM, Department Chemnitz
Project duration: 01. 01. 2001 – 31. 03. 2003
Project goal: Development of layout and technology for a micromachined Fabry-Perot-Interferometer for IR applications; Fabrication of prototypes

SMWA Project „Mikroelektronisches Zündelement für Insassen - Sicherheitssysteme“

Project Manager: Prof. T. Gessner
Partners: Flexiva automation & Anlagenbau GmbH, Amtsberg;
Fahrzeugelektrik Pirna GmbH
Project duration: 01.10. 2003 – 31.12. 2004
Project goal: Development of a new airbag igniter

SMWA Project „Entwicklung mikromechanischer Spiegel für ein IR-Analysesystem“

Project Manager: Prof. T. Gessner
Partners: FhG IZM Abteilung Micro Devices and Equipment
COLOUR CONTROL Farbmeßtechnik GmbH
OPTUM Umwelttechnik GmbH
Project duration: 01.01.2001 – 31.1.2003
Project goal: Development of an IR-Spectrometer with a micromechanical mirror with a special reflective grating on the mirror surface

SMWA Project „VIBSENS: Abstimmbares frequenzselektives Sensorsystem zur Messung mechanischer Schwingungen“

Project Manager: Prof. T. Gessner
Partners: GEMAC mbh Chemnitz
Project duration: 01.01.2002 – 31.12.2003

SMWA Project „Modular measurement system consisting of a tunable FPI and IR sensor - MODUL“

Project Manager: Prof. T. Gessner
Partners: Infra Tec GmbH Dresden, GEMAC mbh Chemnitz
Project duration: 01.09.2003 – 31.08.2005
Project goal: Development of layout and technology for a micromachined Fabry-Perot-Interferometer; Fabrication of prototypes

DFG Project „Poröse Polymere als low-k Dielektrika für Metallisierungssysteme in der Mikroelektronik“

Project Manager: Prof. T. Gessner
Partners: BTU Cottbus
Project duration: 01.02.2002 - 31.01.2004
Project goal: Development and characterization of organic ultra low k material with reduced density; Patterning process development and compatibility with copper interconnect processing.

DFG Project ”Reshaping of silicon microstructures by Laser – a new micro-technological process“

Project Manager: Prof. J. Frühauf
Partner: HTW Mittweida
Project duration: 04.09.2000 – 31.12.2003
Project goal: Reshaping without tool, minimizing of thermal load, development of new shapes

IST-Project “ULISSE : Ultra low k dielectrics for Damascene copper interconnects schemes”

Project Manager: Prof. T. Gessner
Partners: Infineon Technologies (D), Philips Res. Leuven (B), IMEC Leuven (B), ST Microelectronics (F), Bull S.A. (F), LETI Grenoble (F) - (*Project Leader*)
Project duration: 01.09.2001 – 31.10.2003
Project goal: Integration of ultra low k dielectrics
Website: www-leti.cea.fr/commun/europe/ulisse/ulisse.htm

SEA-Project “ACTION : Advanced CVD tool for integration of organosilicated nanoporous films”

Project Manager: Prof. T. Gessner / Dr. S. E. Schulz
Project Leader: ST Microelectronics, Crolles (F)
Partners: AMD Saxony LLC & Co KG (D), Philips Res. Leuven (B), LETI Grenoble (F), Sematech (USA), TRIKON Technologies (UK)
Project duration: 01.05.2002 – 31.01.2004
Project goal: (selected) Provide organosilicated glass (OSG) material with a k-value of 2.2 for interconnect applications for the 90 nm node; Prove cluster tool for full inter metal dielectric (IMD) stack; Demonstrate flexibility

for customized dual-damascene stack architectures; Show Cost-effectiveness compared to multi-tool Spin-on Dielectrics (SOD) methods; Demonstrate performance within a 300 mm production environment.

www.sea.rl.ac.uk

EU-Project Intelligent Manufacturing Systems: “Optical Characterisation Methods for MEMS Manufacturing - OCMMM“

Project Manager: Prof. T. Gessner

Partners: GF Messtechnik GmbH (GFM), FhG.IWU, University of Twente-MESA, Thales Avionique (TH-AV), Yole Développement (YOLE), LioniX (LION), Warsaw University of Technology (WUT)

Project duration: 01. 01. 2001 – 31. 12. 2003

Project goal: Optical Characterisation Methods for MEMS Manufacturing

Industrial Research Contract „Fabrication of multi-use acceleration sensors“

Project Manager: Prof. T. Gessner

Partners: Fara New Technologies, Xi’an, China, GEMAC mbH Chemnitz

Project duration: 01. 09. 2001 – 31. 08. 2003

Project goal: Development of an high precision acceleration sensor system and its fabrication technology; Fabrication of prototypes

Industrial Research Contract „Development of silicon gratings for the assessment of optical and tactile surface measuring instruments“

Project Manager: Prof. J. Frühauf

Partners: GEMAC mbH Chemnitz

Project duration: 15. 09. 2003 – 31. 01. 2004

Project goal: Etching of silicon gratings with trapezoidal, triangular, rectangular and arched profiles

Stiftung Industrieforschung : „Catalogue of Shape and Functional Elements of Bulk-Silicon Microtechnique“

Project Manager: Prof. Dr. J. Frühauf

Project duration: 01. 04. 2002 – 31. 12. 2003

Project goal: Systematical description of shapes and functions realisable by anisotropic wet etching

Project „Design of complex sensor – actuator systems [EKOSAS]“

Project Manager: Prof. W. Dötzel, Dr. J. Mehner

Partner: Siemens AG Munich, CAD-FEM GmbH Grafing, GEMAC mbH Chemnitz, AST Dresden, Univ. Erlangen, FhG IIS/EAS Dresden

Project duration: 01. 01. 2000 – 31. 03. 2003

Project goal: The goal of the project is to develop methods and tools for modeling and simulation of complex microelectromechanical systems which are characterized by strong interactions between physical domains and to the electronic circuitry.

DFG Project „VIVA – Low Power System Bus Encoding“

Project Manager: Prof. D. Müller

Project duration: 01.07.1999 - 31.03.2005

Project goal: Development and implementation of coder-decoder systems for SOC sy-

stem busses which minimize under a set of constraints the total power dissipation on a system bus with its coder and decoder implementation through reduction of switching activity on this bus.

Project „Interface-based Design of complex digital Systems“

Project Manager: Prof. D. Müller
Project duration: 01.07.1999 - 31.03.2003
Project goal: The focus of this project are the development of methods for modelling communication between modules of highly complex systems at different levels of abstraction in terms of hierarchically layered data communication protocols and the realization of corresponding description formalisms as an extension of the language SystemC.

Project „Solutions in the field of color image processing“

Project Manager: Prof. D. Müller
Partners: Siemens A&D Nürnberg, Sächsisches Textilforschungsinstitut STFI Chemnitz
Project duration: 01.12.2003 - 30.06.2004
Project goal: Evaluation of new algorithms in the field of image processing by using FPGAs and realtime processing, investigation of color spaces and classification for color image analysis.

Service order No. 5 for master agreement research and development, entered by AMD and Technische Universität Chemnitz

Project Manager: Prof. C. Radehaus
Project duration: 1. 8. 2003 - 28.02. 2004
Project goal: Automation of the software system GOPI modelling CV-characteristics of gate-oxide-structures – within the framework of the GOPI model – to estimate the parameters

Nano-Technology Center of Excellence “Ultrathin Functional Films”: Pesticide-Sensors based on Immunochemical Reactions and Nano-Electrodes

Project Manager: Prof. C. Radehaus
Project duration: 1.3. 2003 - 31.8. 2003
Project goal: Integration of electronic and optical materials in functional plastic Bio-chips

Project: "Entwicklung von Packagingtechnologien für Bauelemente in Oberflächen-technologie"

Project Manager: M. Krusche, Amtec GmbH
Partners: FhG IWU, TU Chemnitz, Gemac GmbH, Amtec GmbH
Project duration: 05/2002 – 04/2004
Project goal: MEMS packaging for surface micro machined devices

Project: „Prüf- und Qualitätssicherungssystem für die industrielle Fertigung von wafergebundenen Mikrosystemen“ (Mikroprüf)

Project Manager: Dr. H. Reinecke, Steag microParts GmbH
Partners: FhG IWM Halle, TU Chemnitz, X-Fab GmbH, Robert Bosch GmbH, Hegewald & Peschke Mess- und Prüftechnik GmbH
Project duration: 11/2002 – 10/2005