- University of Nevada, Reno, USA
- Nowosibirsk State University, Russia
- University of West Bohemia, Pilsen , Czech Republic
- Portland State University, Portland, Oregon, USA
- Fudan University, Shanghai, China
- Technological University Singapore, Singapore
- Royal Institute of Technology, Stockholm, Sweden
- University of Tokyo, Res. Ctr. for Adv. Science & Technology (RCAST), Japan
- Rensselaer Polytechnic Institute (RPI), Troy, N.Y., USA
- University of Twente – MESA, Netherlands
- Warsaw University of Technology (WUT), Warsaw, Poland
- Atominstitut Universität Wien, Austria
- Xiamen University, Xiamen, China

6 Equipment and service offer

- Laseroptical instrumentation for surfaces utilizing a resolution down to 4 nm (computer controlled laseroptical measuring system with autofocussensor and interference microscope)
- Light-section microscope
- Zeiss-two-coordinate inspection microscope
- Instrumentation for recording of oscillations in the direction vertical to the surface (laser vibrometer)
- Two-channel analyzer
- Instrumentation for stimulation of micro objects and for measuring of the amplitude-frequency response
- Program system for modal analysis
- Instrumentation for recording of electrical values and for generation of stimuli functions based on VXI- respectively GPIB-Bus
- Fischerscope for measuring hardness and recording of spring characteristics
- Electronic Speckle Pattern Interferometer for static and dynamic deformation analysis of microstructures in the nanometer range
- Instrumentation for pressure-measuring
- Scanning Probe Microscope D 3000
- Nanolithographysystem LEO
- Optoelectronic laboratory equipment
- Rapid Prototyping with FPGAs
- Design of integrated high-voltage circuits
- Characterization and modelling of devices from high-voltage microtechnologies
- Design of low power and low noise analogue-mixed signal integrated circuits
- Characterization of analogue-mixed signal circuits up to 500 MHz
- Development of solar cells with appropriate price-performance ratio
- Simulator for silicon wet etching SIMODE
- Etch mask design tool EMADE
- FEM-Analysis with commercial ANSYS-Version on HP-workstation for simulation of mechanical behaviour and coupled fields
- Different CAD tools: EMS, PC- Draft, Microstation PC, ProEngineer, HFSS, EESOF

Center for Microtechnologies (ZfM) :

The ZfM facilities include 1000m² of clean rooms (about 30% of them class 10 to 100) and modern **equipments** were installed for processing of 100 mm and 150 mm wafers as well as design and testing laboratories providing the basis for the following processes, partly in cooperation with the Fraunhofer Institute IZM, branchlab Chemnitz:

- Design (Workstations)
- Mask fabrication 3" ... 7" / Electron beam lithography / Proximity and contact double-side mask aligner
- High temperature processes: Diffusion / Thermal oxidation / Annealing / RTP
- Etching (dry: Plasma- and RIE-mode & wet: isotropic / anisotropic)
  (Alcatel MCM, SECON XPL 251, STS Multiplex ICP-ASE, Metal Etch DPS Centura)
- Chemical vapor deposition MOCVD (Precision 5000 [Cu, WN, TiN])
- Chemical vapor deposition PECVD (Precision 5000 [SiO_2, Si_3N_4, CF-Polymer])
- Physical vapor deposition PVD (MRC 643, FHR 150x4, CLC 9000, ...)
- Silicon etching (isotropic and anisotropic)
- Chemical mechanical polishing CMP
- Silicon fusion bonding / Anodic bonding (Suss)
- Testing (SEM, AFM, electrical – hp 4062 UX , HP 4061 A , HP 4339A , ...)

The ZfM provides the following services :

R & D

(e.g. Si processes, technology, development of sensors and actuators, metallization)

- Thermal oxidation of silicon wafers
- PVD (Cr, Au, TiN, Cu , Pt, Al, W, TiW, $AlSi_x$,CrNi, Pyrex)
- CVD: PECVD / LPCVD (600° C ... 900° C)
  (SiO_2 , Si_3N_4 , Polysilicon, $Si_xO_yN_z$, Cu-MOCVD, TiN-MOCVD, SiCOH, SiCH)
- Dry etching (Si, SiO_2 , Si_3N_4 , Polysilicon, Silicides, Al, Cu, refr. metals, TiN, Cr)
- Wet etching (SiO_2 , Si_3N_4 , Si, Polysilicon, Al, Cr, Au, Pt, Cu, Ti, W)
- Wafer lithography / Electron beam lithography / Mask fabrication (3" ...7" Cr mask)
- Design & simulation (technology, process....)
  Software: ANSYS, SIMODE, PHOENICS, SIMBAD, EVOLVE ,
  Etch mask design tool EMADE

and in **analytical fields** such as

- Scanning electron microscopy SEM / EDX
- Atomic force microscopy AFM (D 3000)
- Ellipsometry / Nanospec
- Laser profilometry (UBM, TENCOR FLX-2900)
- Surface profilometer (TENCOR alpha step 200, Dektak 3)
- US-Microscope
- Zug-/Druckprüfmaschine Zwick 4660 universal
- Perkin-Elmer DMA 7e dynamic mechanical analyser
- Micromechanical testing instrument (Sartorius and PI)
- Lifetime scanner SEMILAB WT-85

In cooperation with the Fraunhofer Institute IZM, branchlab Chemnitz:

- STS „Multiplex ICP" etch tool for deep silicon etching
- Wafer bonding (silicon fusion bonding, anodic bonding, eutectic bonding, Seal-glass-bonding, adhesive bonding)
- CMP MIRRA & ONTREK-cleaner (Copper, Silicon, SiO_2)
- Test measurements for MEMS