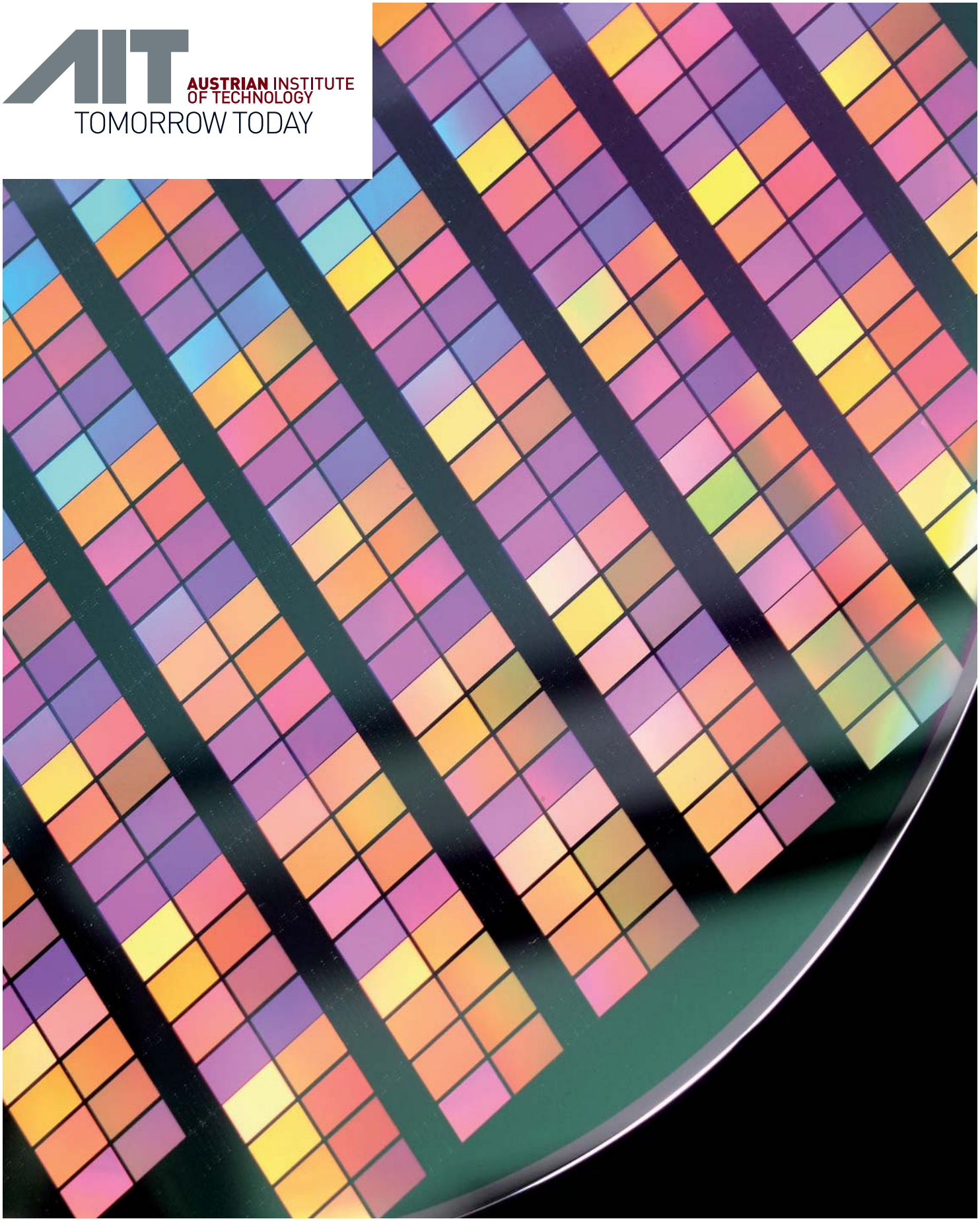
AUSTRIAN INSTITUTE OF TECHNOLOGY
TOMORROW TODAY



CTFT

CENTER OF THIN FILM TECHNOLOGY

HEALTH & ENVIRONMENT DEPARTMENT

CTFT - CENTER OF THIN FILM TECHNOLOGY

The research unit Nano Systems of the AIT Health & Environment Department (H&E), combines semiconductor technologies and thin film processes with innovative concepts from nano- and bio-sciences. H&E operates the 'Center of Thin Film Technology' (CTFT), a technology center for heterogeneous integration of multifunctional components based on different technologies and materials. In order to develop novel NEMS, nanotechnological components such as ultrathin functional layers, nanoparticles and nanowires are integrated with photonic and microelectronic devices and MEMS components such as sensors, actuators, microfluidics and microheaters. Numerical modeling supports the hardware development. The integration of bio-, nano- and biomimetic interfaces and materials is the key to product improvements and novel solutions for our partners and customers.

RESEARCH

The research activities concentrate on applications in the health care and environmental monitoring sector. We develop functional thin films and use novel properties of nanotechnologies for systems and tools in bio-/medical diagnostics, lab-on-a-chip systems, sensors and photovoltaics. Main research topics are magnetic and optical biosensors, semiconducting gas sensors, metamaterial based imaging sensors, smart thin films for solar cells, magnetic lab-on-a-bead systems for biomolecular diagnostics and lab-on-a-chip systems for human cells.
The Health & Environment Department is your reliable and ingenious research partner for your product innovations*.

* AIT is certified by ISO 9001

RESEARCH SERVICES

We carry out applied research to develop innovative concepts into novel products together with our partners and customers. Our simulation capacity ensures fast implementation based on consistent validation of the numerical models with physical prototype parameters. The CTFT is equipped with state-of-the-art micro- and nanotechnological instrumentation and comprises precise thin film deposition, nanowire and nanoparticle fabrication, lithography and analytical tools with resolution at the nanometer scale. The facilities of the CTFT offer a wide range of analytical methods for geometric and physical sample measurement, which are also made available to our partners and customers within the framework of cooperation projects.

- Magnetron sputtering:
  DC and RF, 4-chamber-system plus load-locksystem, 100 mm wafer and target size, up to 12 materials in combination, suitable for ferromagnetic materials, SPS-controlled, programmable
- Plasma oxidation chamber, flanged to the sputter system
- Thermal and e-beam evaporation in UHV chamber, up to 100 mm substrate size
- Thin film spray pyrolysis on 100 mm large substrates
- Argon ion etcher:
  ECR-source for Ar^+ ion etching, integrated mass spectrometry for a controlled etch stop, up to 150 mm wafer size, variable etching angles, cooling stage
- Growth chambers for metallic and semiconducting nanowires
- Optical and electron-beam lithography
- Analytical tools for structural, physical and electronic characterization:
  - Scanning electron microscope: Including scanning transmission electron detector and four-quadrant backscattering detector
  - Scanning probe microscope and spectroscopy: topography, magnetic imaging, also in fluids
  - Film thickness measurement
  - Electrical characterization: 4-point probe up to 20 GHz, magnetoresistance
  - Test stage for gas sensors: Controlled environment
  - Magnetization by Magneto-optical Kerr effect
  - Characterization of integrated optical devices
  - UV-VIS-NIR spectrometer, monochromator
  - Test systems for surface plasmon resonance setups
  - Test stage for integrated optical waveguides

APPLICATION SPECTRUM

- Single and multilayer films
- Functional coatings: E.g. Au, Pt, ZnO, ITO, MgO, AlN, Al_2O_3
- Conducting layers and surfaces
- Hard coatings
- Surface engineering by combination of nanowires and coatings
- Hybrid multifunctional nanoparticles
- Spintronics: Magnetic and magnetoresistive sensors
- Giant magnetoresistance (GMR) and tunnel magnetoresistance (TMR)
- Gas sensitive SnO_2 films and nanowires: E.g. for CO, CH_4, H_2
- Diffusion barriers for high temperature applications
- Functional integrated waveguide devices like Mach-Zehnder-Interferometer
- Interdigitated electrode systems for dielectric sensors
- Surface plasmonic layers

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