



Chemo and Biosensor Technology

Our researchers specialize in the development and technological implementation of chemical and biological sensors. These are compact analytical systems that allow for continuous monitoring of chemical, metabolic or biological parameters such as, for example, oxygen, glucose or lactate, but also of toxic gases, heavy metals, bacteria and toxins.

The research team is a leader in the development of optical chemical sensors (optodes) and measurement systems used in process control, medical diagnostics, environmental analysis, authentication and food monitoring.

In addition, new materials for screen printing, inkjet printing and aerosol-jet printing of electrode structures, as well as methods for surface functionalization and structuring of polymeric materials for biosensors, are developed.



<https://www.pyzoflex.com/>



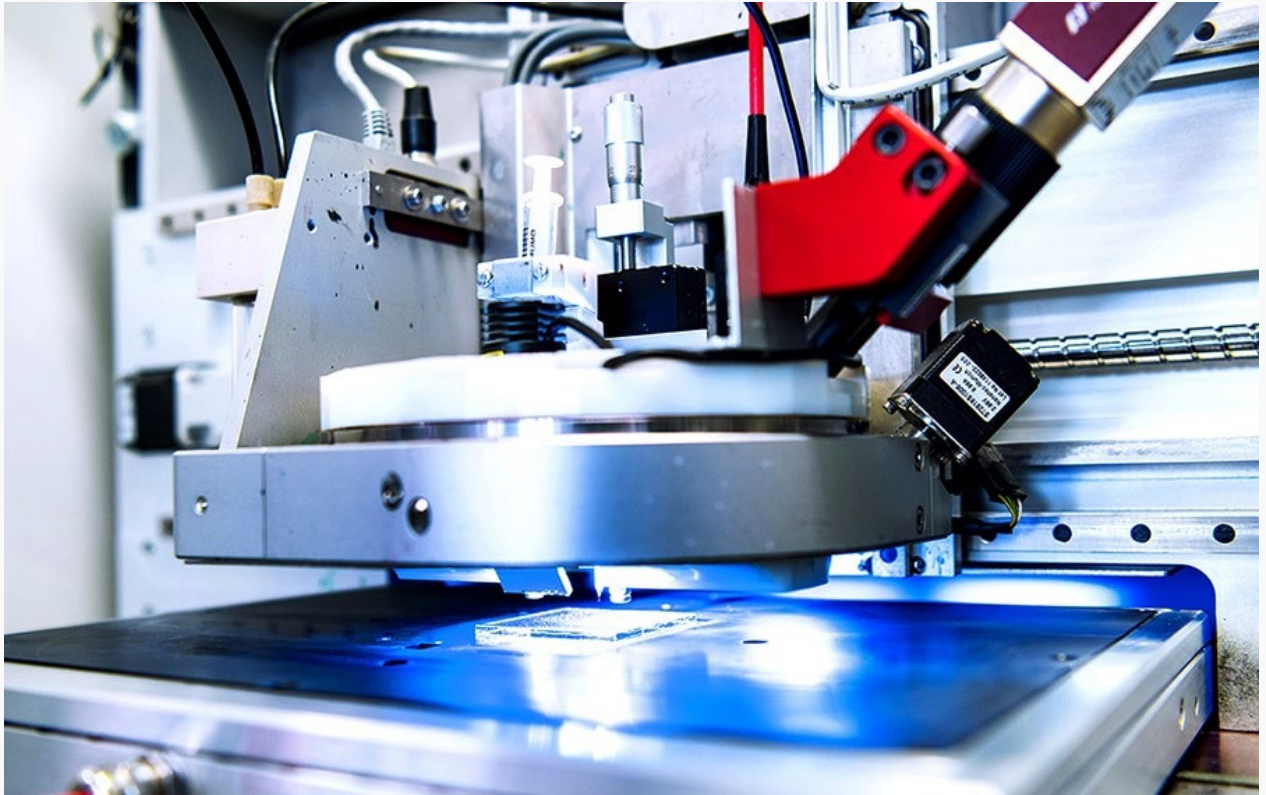
A multi-functional sensor technology

PyzoFlex®

PyzoFlex® is a fully printed sensor technology based on a printable electro-active-polymer ink, which combines many big and small advantages. Main advantages are (i) simple production through a scalable (screen) printing process, (ii) easy adaptation of the sensor design to the specified application in size & shape, (iii) printing of the sensor on a wide variety of substrates including plastic film, paper, glass, metal and many more, and (iv) an energy-autonomous measuring principle of the sensor foil - suitable for energy harvesting.

We are able to comply with customers' needs at a low cost.

PyzoFlex® allows for multimodal sensing and detects smallest changes in temperature (ΔT ; pyroelectric), pressure (ΔP ; piezoelectric) as well as structure born sound (Hz; vibration). PyzoFlex® can therefore be used as a fitting solution for a wide range of applications: *IoT, consumer electronics, security, automotive, wearables, smart living and life science, sports, industry 4.0 (condition monitoring, predictive maintenance, structural health monitoring etc.) and many more....*



Functional Printing

At JOANNEUM RESEARCH we run the largest Austrian research group for functional printing. Possible applications include, for example, the printing of electrical conductors, sensors or fluorescent structures.

Our interdisciplinary team of highly qualified experts has many years of experience in the development of printing processes and is happy to discuss your application and the related requirements with you.

- Development of customized 2D, 2.5D and 3D printing processes using available technologies:
 - Inkjet printing
 - Aerosol Jet Printing
 - Electrostatic Jet Printing (ESJET)
 - Solenoid valve printing
 - Flexography
 - Screen printing
 - Microarray Spotting
- Customized software and hardware adaptations for the PIXDRO LP50 printing platform
- Ink development and ink characterization
- Ink evaluation and ink printability testing
- Substrate surface functionalization and substrate characterization
- Waveform optimization via drop-watcher experiments (inkjet)
- Thermal and Photonic post-processing
- Characterization by optical microscopy, AFM, SEM
- Conductivity tests of printed structures
- Stability tests under various environmental influences (temperature, humidity, ...)
- Customer-specific training and consulting



Lab on Foil/Lab on Chip solutions

We offer our customers ranging from start-ups to large enterprises the services needed for the development and pilot line production of innovative and low cost microfluidic systems for:

- Point of care systems for molecular diagnostic
- Mobile devices for food safety analysis
- Smart phone based home diagnostics
- Organ-on-a-chip solutions for personalized medicine
- Chip based cell screening
- Plant nutrient analysis
- Cell culture substrates
- Flow chemistry

Our expertise are miniaturized biosensors and integrated microfluidic systems (lab-on-a-chip devices) that are based on polymer materials. Starting from simulation, we are developing novel manufacturing processes based on both micro- and nanopatterning methods, digital printing technologies, special surface modifications as well as optics and electronics.

In this way, lab-on-a-chip devices with built-in optical or electronic detection systems are designed and can be used, for example, to identify pathogenic organisms, for food sampling, environmental analysis, or medical diagnostics.

Smart Connected Lighting

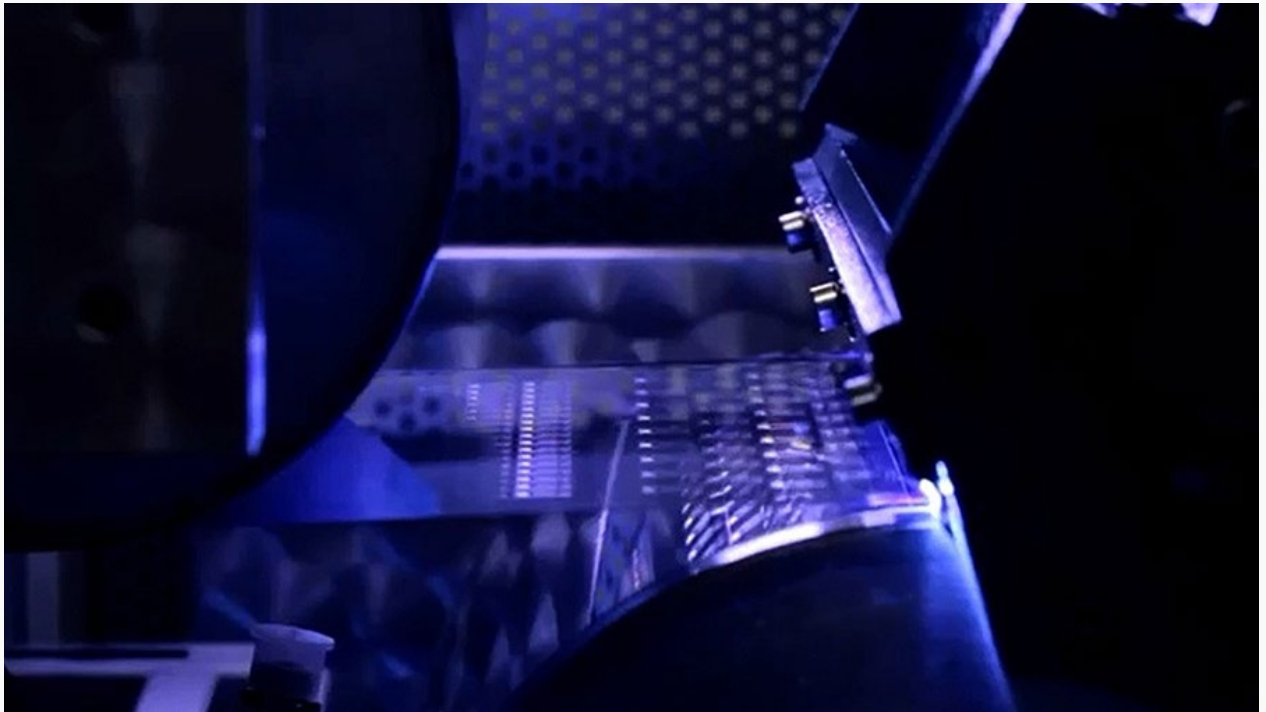
The focus of Smart Connected Lighting consists in the realisation of extensive light and lighting concepts including sensor systems, controls, regulation, networking and communication.

Functional lighting can be used in the following application areas:

- Smart Buildings
- Smart Cities
- General lighting
- Automotive
- Smart Farming

The value chain of state-of-the-art LED light solutions:

In addition to the targeted production of lighting scenarios, prospective lighting systems will make it possible to acquire or transmit a multitude of data that must in turn be further processed and evaluated intelligently.



Roll-to-Roll Nanoimprintlithography (R2R-NIL)

The roll-to-roll nanoimprint lithography (R2R- NIL) facilitates continuous and therefore cost-effective production of micro and nano-patterns on large-area flexible substrates. These can be used in optical, electronic, sensor, or biomimetic applications.

Roll-to-roll micro- and nano-structuring thus forms the basis for the development of novel and cost effective products in Key Enabling Technology fields such as biotechnology, nanotechnology, as well as advanced materials or advanced manufacturing and production technologies.

The established knowledge in design, fabrication, characterization and optimization is available to industry in combination with the roll-to-roll pilot line for the development of sustainable industry-compatible manufacturing processes.