



## **FRAUNHOFER IMS**

### **INNOVATIONS ON SILICON**

Fraunhofer IMS in Duisburg has more than 25 years experience and proven expertise in microelectronic circuit design and fabrication.

Our silicon solutions can be found in various application areas like satellites, aircrafts, medical implants, automotive, industrial, automation, and consumer electronics. Full supply chain services provide a seamless path from the first idea through development to production according to highest quality and reliability levels. This includes long term support considering our customers product lifetime requirements.

The Fraunhofer IMS is a major R&D provider for wireless biosensor system solutions. In this field the IMS covers the range from novel sensors as well as innovative solutions for standard measurement tasks. All developments are done according to ISO 9001. Further manufacturing will be realized in the ISO 16949 / ISO 9001 qualified cleanroom-production facilities. In the new and state-of-the-art biosensor lab integrated electrochemical and immuno-sensing capabilities will be implemented by production-compatible bio-functionalization technologies for customized integrated sensor systems.

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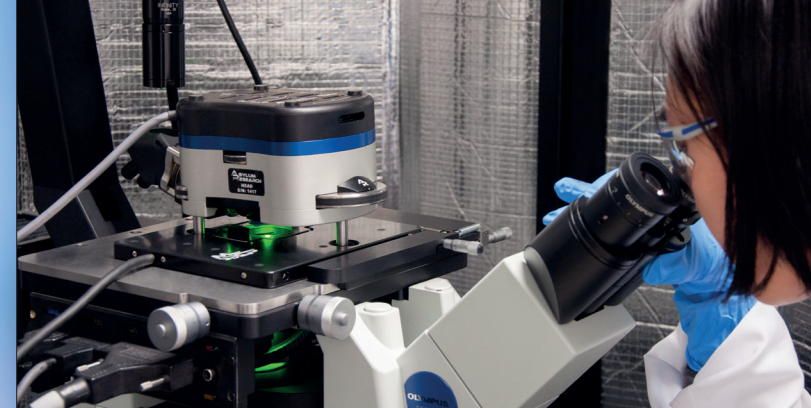
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## **BIOHYBRID SYSTEMS**





## BIOHYBRID SYSTEMS

The Fraunhofer IMS is at the cutting edge of MEMS-, nano-, and biosensor-technology, which combines traditional CMOS technology with innovative post-processed bio- and nanostructures.

In the last decade, the semiconductor technology has been seeing a new trend, called »More than Moore«, where added values to silicon-based devices are provided by incorporating new functionalities.

The ability to interface biological elements and silicon-based devices offers the opportunity to propose fully integrated solutions for biosensors. Biohybrid systems – i.e. BioMEMS and BioCMOS, microfabrication and microelectronic technologies suitable for biological applications – have great potential for miniaturized biosensors, microchip arrays or portable Point-of Care Testing (POCT) applications.

- Customized biosensor systems (e.g. glucose, lactate)
- Markerless and quantitative sensor technology
- Real-time monitoring in body fluid
- Customized electrochemical sensor technology
- Immuno sensor technology
- Application specific packages and tests

## SERVICE AND KNOW-HOW

### Chemical activation of surfaces

- Plasma treatment ( $O_2$ ,  $H_2$ )
- Chemical modifications (silanization, PEGylation)

### Control of functionalization process

- Biochemical conjugation monitoring
- Surface immobilization

### Characterization of functionalized surfaces

- Coating properties
- Biofunctionalization characterization

### Biofunctionalized electrodes and nanostructures

- Electrochemical enzymatic electrodes
- Interdigitated capacitive electrodes
- Mass-sensing MEMS devices
- 2D and 3D nanostructures, including nanoneedles, nanowires, nanotubes

## LAB CAPABILITIES

The equipment available in the Biohybrid Systems laboratory facility enables the integration of biological elements on compatible surfaces, e.g. metals, oxides, silicon, glass, carbon nanotubes (CNTs), graphene. It includes:

- UV-Vis and fluorescence spectroscopy (absorption, excitation, emission spectra)
- Dynamic Light Scattering
- Zeta-potential measurement
- Contact angle measurement
- AFM, optimized for operation in water and biological samples
- Optical microscopy (bright field, fluorescence)
- Surface Plasmon Resonance
- Electrochemistry and impedance Spectroscopy
- Nano-Dispenser