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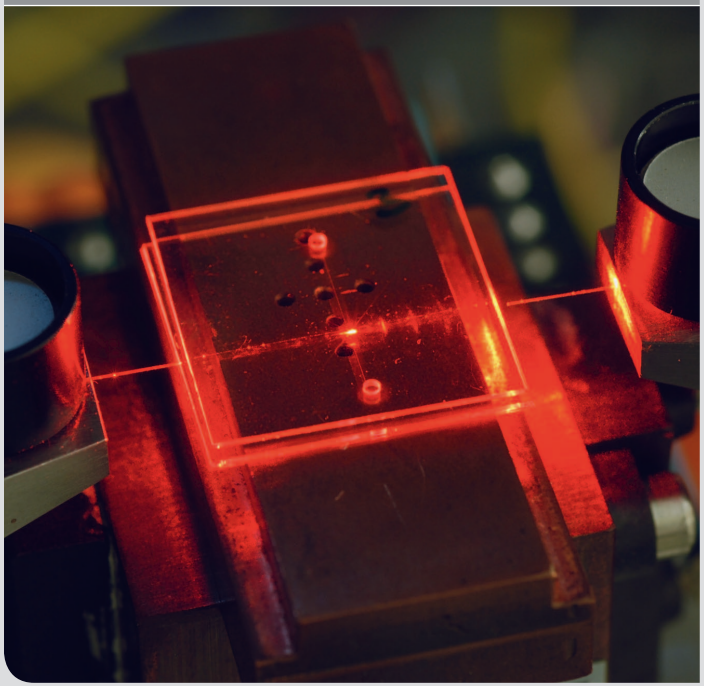
Young Investigator Group „Biophotonics Sensors“

Micro-optical Sensors for Applications in Life Science

INSTITUTE OF MICROSTRUCTURE TECHNOLOGY (IMT)
LIGHT TECHNOLOGY INSTITUTE (LTI)



KIT – University of the State of Baden-Wuerttemberg and
National Research Center of the Helmholtz Association

www.kit.edu

Young Investigator Group "Biophotonic Sensors"

Our aim is to create a technological basis for novel miniaturized polymer-based sensor systems for fluid analysis in chemistry, biology, and medicine:

- Optimization of process techniques and simulations for highly integrated sensor systems
- Ability to sense specific biomedical parameters
- Development of solutions for the integration of microfluidic and microoptical components and subsystems
- High sensitivity, minimal amount of analyte and low production costs

This Young Investigator Group (YIG) was established in the frame of the German Excellence Initiative and is partially funded by the Karlsruhe Institute of Technology (KIT).

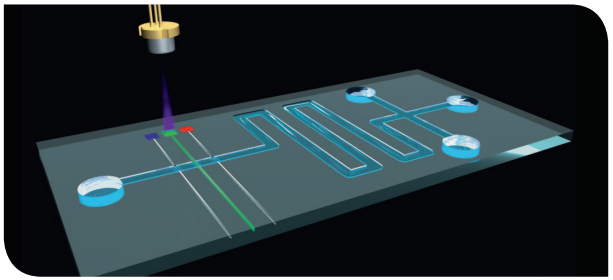
The interdisciplinary team works at the Institute for Microstructure Technology (IMT) in close collaboration with the Light Technology Institute (LTI) and the Institute of Applied Physics (APH).
www.biophotonic-systems.com

The PhD projects within this group are implemented in the Karlsruhe School of Optics and Photonics (KSOP).
www.ksop.de

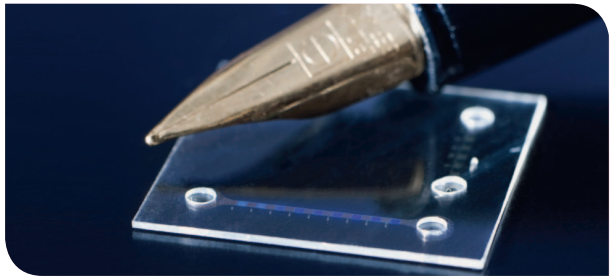
KSOP
Karlsruhe School of Optics & Photonics

Disposable Optofluidic Lab-on-a-Chip Sensor Systems in Polymer for Life Science Applications

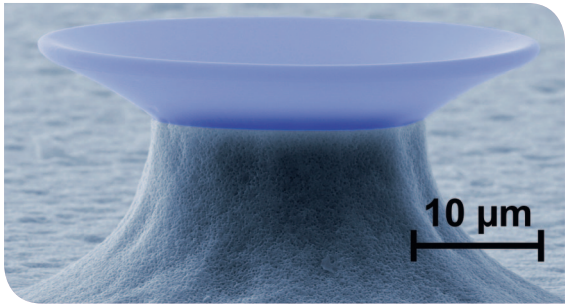
Biophotonic sensor systems
The goal of our group is the development of optofluidic polymer sensors for life sciences, designed as all organic Lab-on-a-Chip applications, with integrated miniaturized lasers. The final devices are dedicated to be used as disposables with solely optical and fluidic interconnects. The entire approach is divided into several individual, closely interacting PhD projects.



Tunable DFB lasers
On-chip distributed feedback (DFB) lasers out of solid state organic semiconductors and liquid cores are investigated and optimized for tuning over the entire visible spectral range. These lasers are evaluated regarding their optical parameters, different pumping schemes and large-scale fabrication.



Active and passive polymeric resonators
Novel polymeric resonators introduced within the work of this group are optimized for high quality factors, microfluidic integration, and optical readout. The interaction zones of light and analyte on the chips are functionalized for sensing parameters of dedicated biomedical applications. Thus, the combination of active and passive optical components and microfluidics developed in our group completes the chip for fluid analysis in chemistry, biology, and medicine.



Technology
The group works in the cleanrooms and optics labs of the Institute for Microstructure Technology (IMT), the Light Technology Institute (LTI) and the Institute of Applied Physics (APH). All infrastructure required for our research is on KIT campus: high-end e-beam system, mask aligner for UV lithography, electroforming, thermal nanoimprint and evaporation of organic semiconducting layers.