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PHOTONICS FOR MEDICAL DIAGNOSTICS: FROM THE LAB TO THE MARKET

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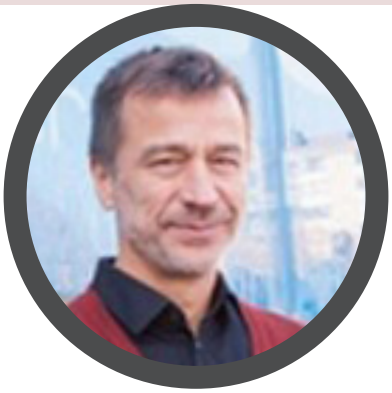
Microsystems engineering, nanotechnology and bio nanotechnology open new opportunities in medical diagnostics and treatment. For the first time, physics and engineering can be combined with medicine and biology on a very fundamental level. Modern technology allows approaching physiological processes *in situ* and gives access to the interior of the body by non-invasive techniques. A variety of optical and photonic methods have been developed on a high scientific level, and also on a well-engineered technical level. Bringing novel methods and technology into the market turns out to be a major challenge, and most of all developments and approaches do not reach the market, even though they show great performance and potential. The key to access the market is developing strategies for the acceleration of technology transfer and to follow those before the idea is realized in the lab. Communication and understanding of the different languages of scientists, engineers, clinicians and industrial partners is crucial for bridging the gap between academia and industry. The market or end user needs are the driving force to set the direction of successful developments from the lab to the market. The talk highlights examples of photonic methods employed in medical diagnostics, as for example the development of a combined Raman-FTIR spectroscopy system to detect Alzheimer's disease in an early stage; the development of method and instrumentation for *in situ* and real-time tissue differentiation during tumor resection; a photonic approach for continuous intrapartum fetal monitoring to reduce risks during delivery. In collaboration with clinical and industrial partners, the Nanoengineering Group at nanoGUNE develops photonic and plasmonic methods and systems for medical diagnostics, food control, environmental monitoring, and consumer goods for sports industry.



Biography

After his PhD in physics, Andreas Seifert moved to optical industry and had been working as head of department with Carl Zeiss (Germany) from 1998 to 2007, managing technology for EUV lithography and being responsible for synchrotron and space optics. In 2007 he became group leader in the Department of Microsystems Engineering, University of Freiburg. His research lines covered optical and biomedical microsystems, specifically for cardiovascular monitoring and tissue differentiation. In 2015 he gained the position of an Ikerbasque Professor at CIC nanoGUNE in San Sebastián (Spain) and is leading the Nanoengineering Group. The research concentrates on photonics/plasmonics for biomedical diagnostics with the strategy of bridging the gap between fundamental science and real-life applications and accelerating technology transfer. The most prestigious awards he received are the 'Rudolf Kingslake Medal and Prize 2013' and the 'Carl Zeiss Innovation Award 2006'.

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