



DEPARTMENT OF CHEMISTRY SEMINAR SERIES

Miniaturized Mid-Infrared Sensor Technology: Potential and Applications

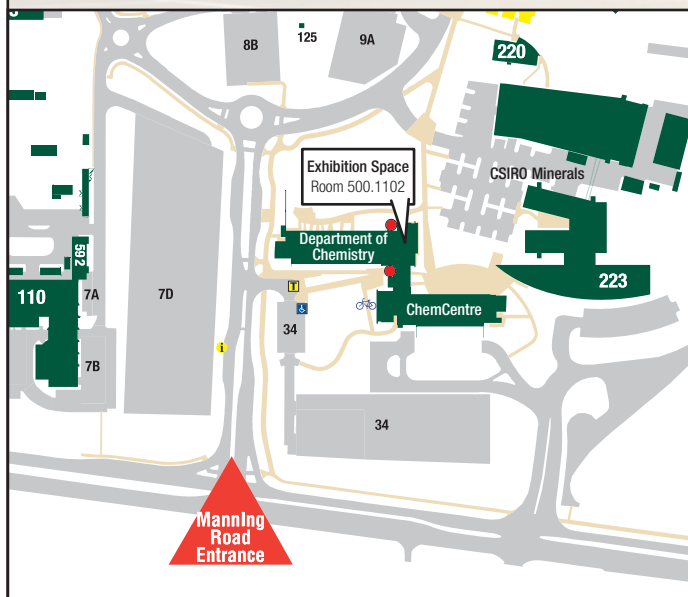
Dr. Boris Mizaikoff

University of Ulm, Institute of Analytical and Bioanalytical Chemistry, 89081 Ulm, Germany
uni-ulm.de/iabc --- boris.mizaikoff@uni-ulm.de

State-of-the-art sensing platforms ideally benefit from miniaturized and integrated optical technologies providing direct access to molecule-specific information. With point-of-care and personalized medicine becoming more prevalent, detection schemes eliminating reagents or labeled constituents facilitate localized on-site analysis close to real-time.

However, decreasing the analytically probed volume may adversely affect the associated analytical figures of merit such as the signal-to-noise-ratio, the representativeness of the sample, or the fidelity of the obtained analytical signal. Consequently, the guiding paradigm for the miniaturization of optical diagnostic devices should be creating chem/bio sensing platforms that are as small as still useful, rather than as small as possible, and that smartly capitalize on integrated photonics.

Mid-infrared (MIR; 3-20 μm) sensor technology is increasingly adopted in environmental analysis, process monitoring and biodiagnostics due to the inherent molecular specificity enabling the discrimination of molecular constituents at ppm-ppb concentration levels in condensed and vapor phase media. Recently emerging strategies taking advantage of innovative substrate-integrated waveguide technologies such as mid-infrared transparent fiberoptics, hollow waveguides and planar semiconductor waveguides (e.g., MIR Mach-Zehnder interferometers) in combination with highly efficient light sources such as miniaturized IR spectrometers and broadly tunable quantum cascade lasers facilitate compact yet robust MIR diagnostic platforms for label-free chem/bio sensing and diagnostics that may readily combine with complementary analytical tools.



Friday, 22th November 2013 at 4:00 PM
Exhibition Space, Building 500, Room 1102

For more details about the
Chemistry Seminar Series, please contact:

Dr Paolo Raiteri
Telephone 08 9266 2687
Email p.raiteri@curtin.edu.au



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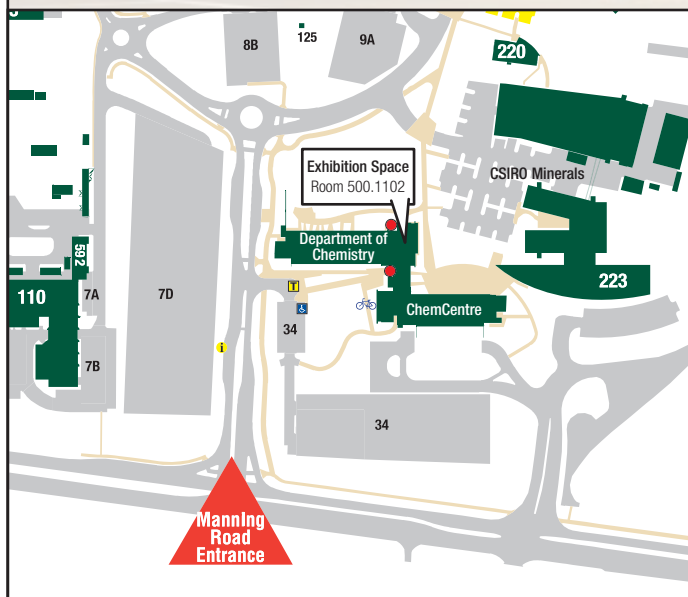
Short Biography

Dr. Boris Mizaikoff received his Ph.D. in Analytical Chemistry at the Vienna University of Technology in 1996. Heading the Chemical Sensor Laboratory (CSL) he has been responsible for numerous research projects in the field of chemical IR sensors, including 4 multinational projects funded by the European Union. In 1997, he has been with the University of Texas, Austin/USA as a postdoctoral fellow. In October 2000 he finalized his Habilitation (Assoc. Prof. for Analytical Chemistry) at the Vienna University of Technology. Since Fall 2000 he was faculty member at the Georgia Institute of Technology, School of Chemistry and Biochemistry, heading the Applied Sensors Laboratory (ASL). Since 2004 he was Director of the Focused Ion Beam Center (FIB2 Center) at Georgia Tech, and since 2005 member of the Center for Cell and Molecular Signaling at Emory University, School of Physiology. In Fall 2007, he has joined the faculty at the University of Ulm, Germany, as a Chaired Professor heading the Institute of Analytical and Bioanalytical Chemistry. Today, his research interests focus on optical sensors, biosensors, and biomimetic sensors operating in the mid-infrared spectral range, applications of novel IR light sources (e.g., quantum cascade lasers), system miniaturization and integration based on micro- and nanofabrication, multifunctional scanning nanoprobes (e.g., combination AFM-IR and AFM-SECM-IR), scanning probe tip integrated nano(bio)sensors, focused ion beam (FIB) microscopy, development of chemical recognition interfaces for separation and sensing applications (e.g., molecularly templated materials), chemometric data evaluation, advanced vibrational spectroscopic techniques (e.g., SEIRA), environmental analytical chemistry, process analytical chemistry, and biomedical diagnostics. Dr. Mizaikoff is author/co-author of over 190 peer-reviewed publications, 17 patents, and numerous invited contributions at scientific conferences; his current h-index is 30. He has received a series of awards including the 2010 Craver Award (Coblentz Society), the 2005 Pittsburgh Conference Achievement Award (Society for Analytical Chemists of Pittsburgh), the 2004 Fritz Feigl Award (Austrian Society of Analytical Chemistry), and the 2004 Meggers Award (Society of Applied Spectroscopy). In 2005, he was elected Fellow of the American Association for the Advancement of Science (AAAS), and in 2013 Fellow of the Royal Society of Chemistry (RSC).



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