



# Workshop

*devoted to the scientific lifework of Dieter Naumann*

## FTIR Spectroscopy in Microbiological and Medical Diagnostics

Robert Koch-Institute, Berlin  
October 20-21, 2011

### Program

Thursday, October 20th

- |               |   |
|---------------|---|
| 8:30 - 9:45   | <b>Registration</b>   |
| 10:00 - 10:15 | Opening Remarks   |
| 10:15 - 10:35 | <b>M. Wenning</b> (Freising, Germany)<br>Strain typing by FTIR spectroscopy as a tool in food microbiology  |
| 10:40 - 11:00 | <b>V. Shapaval</b> (Ås, Norway)<br>Source tracking of food spoilage moulds and yeasts by FTIR spectroscopy  |
| 11:05 - 11:25 | <b>A. Bosch</b> (La Plata, Argentina)<br><i>Burkholderia contaminans</i> in cystic fibrosis: FT-IR spectroscopy-based study of phenotypic variation and diversity among isolates in long-term infection |
| 11:25 - 11:55 | <b>Coffee Break</b>   |
| 12:00 - 12:20 | <b>G. Puppels</b> (Rotterdam, The Netherlands)<br>The SpectraCell RA Bacterial Strain Analyzer  |
| 12:25 - 12:45 | <b>P. Rösch</b> (Jena, Germany)<br>Culture-free identification of pathogens by means of micro-Raman spectroscopy  |

- 12:50 - 13:10      **B. Wood** (Melbourne, Australia)  
A comparison between Raman and FTIR focal plane imaging for diagnosing malaria parasites in single cells
- 13:15 - 14:00      **Lunch**
- 14:00 - 14:20      **J. Kneipp** (Berlin, Germany)  
SERS for studies of cells: From basic concepts to practical tools
- 14:25 - 14:45      **R. Dluhy** (Athens, USA)  
Novel nanorod array substrates as a platform for SERS-based biosensing of infectious disease
- 14:50 - 15:10      **N. Ivleva** (Munich, Germany)  
Label-free *in situ* Raman and SERS imaging of biofilms
- 15:15 - 15:35      **O. Sire** (Vannes, France)  
The water clock of *Proteus mirabilis* paces colony periodic and synchronous swarming
- 15:40 - 16:10      **Coffee Break**
- 16:10 - 16:30      **H.M. Heise** (Iserlohn, Germany)  
Review on 25 years of IR-spectroscopy in clinical chemistry: Blood and cell-free body fluids
- 16:35 - 16:55      **W. Mäntele** (Frankfurt/M, Germany)  
IR spectroscopy goes to the hospital: Progress in reagent-free blood analysis and haemodialysis monitoring
- 17:00 – 17:20      **W. Petrich** (Heidelberg, Germany)  
Biomedical vibrational spectroscopy for glucose monitoring *in vivo*?
- 17.50 - 19.30      **Poster Session**
- P 1**    **M. Baranska, K. Malek** (Kraków, Poland)  
Imaging of lipids in atherosclerotic lesions by FT-IR spectroscopy and hierarchical cluster analysis
- P 2**    **C. Beleites** (Jena, Germany)  
Validation of soft classifiers for cells and tissues
- P 3**    **G. Bellisola, M. Vezzalini** (Verona, Italy)  
Testing drug resistance/sensitivity in leukemic cell lines by microFT-IR
- P 4**    **A. Bonifacio** (Trieste, Italy)  
Raman imaging of a living multicellular organism: A study on the nature, source and function of pigments in *Echiniscus Tardigrades*

- P 5 T. Büchner** (Berlin, Germany)  
Surface-Enhanced Raman Scattering on hemoglobin
- P 6 D. Cialla** (Jena, Germany)  
Towards multimodal readout application of plasmonic arrays verified by DNA detection schemes
- P 7 V. Ciobotă** (Jena, Germany)  
The effect of storage materials on the identification results of bacteria by means of Raman spectroscopy
- P 8 K. L. Cloyd** (London, U.K.)  
Examining aortic valvular interstitial cells live utilizing Raman spectroscopy
- P 9 G. M. A. de Abreu** (São Paulo, Brazil)  
Fourier transform infrared microspectroscopy as a dynamic tool in rapid identification of clinically and hospital relevant microorganisms
- P 10 P. Demir** (Ankara, Turkey)  
FTIR spectroscopic investigation of ionizing radiation-induced damage and possible protective effect of melatonin on rat brain crude membrane proteins and lipids
- P 11 A. Dogan** (Berlin, Germany)  
ATR-FTIR spectroscopy reveals genomic loci regulating the tissue response in high fat diet fed BXD recombinant inbred mouse strains
- P 12 D. Drescher** (Berlin, Germany)  
Combination of SERS and advanced microscopic methods for the investigation of protein-particle-cell interactions
- P 13 P. Gardner** (Manchester, U.K.)  
Fourier Transform Infrared (FTIR) spectroscopy analysis of human pancreatic progenitor cell lines
- P 14 M. Grube** (Riga, Latvia)  
FT-IR analysis of dermal stem cell macromolecular profile during neurodifferentiation
- P 15 M. Grube** (Riga, Latvia)  
Development of FTIR method for simultaneous baker's yeast *Saccharomyces cerevisiae* biomass and trehalose quantifications
- P 16 M. Gühlke** (Berlin; Germany)  
Bifunctional silver / iron oxide nanostructures for the combination of magnetic separation and SERS
- P 17 M. Hedegaard** (London, U.K.)  
Stem cell treated osteogenesis imperfecta bone imaged using Raman spectroscopy
- P 18 H. M. Heise** (Iserlohn, Germany)  
Cultivation of *Chlorella sorokiniana* microalgae under nitrogen limitation with composition monitored by FTIR spectroscopy using the KBr-micropellet technique
- P 19 H. M. Heise** (Iserlohn, Germany)  
Comparison of different measurement techniques for IR-spectroscopic characterisation of microorganisms

- P 20 P. Hermann** (Berlin, Germany)  
Correlation of electron microscopy and near-field Raman spectroscopy
- P 21 C. Hughes** (Manchester, U.K.)  
Advancements in single cell FTIR imaging: Evaluating RMieS-EMSC corrected single cell images at the diffraction limit
- P 22 M. Jimenez Hernandez** (Manchester, U.K.)  
A novel technique for the extraction of single cell spectra from an IR image
- P 23 V. Joseph** (Berlin, Germany)  
Design and characterization of SERS active surfaces for use in analytical applications
- P 24 A. Jungandreas** (Leipzig, Germany)  
Analyzing the silica content in diatoms via FTIR spectroscopy
- P 25 S. Khaustova** (Moscow, Russia)  
Fiber sensors for noninvasive physical stress monitoring
- P 26 S. Kloß** (Jena, Germany)  
Single-Cell-Identification of different Streptococcus species by micro-Raman spectroscopy
- P 27 S. Kostudis** (Jena, Germany)  
Investigation on host response of human monocytes by Raman spectroscopy
- P 28 J. Kowalska** (Kraków, Poland)  
 $\mu$ -FTIR and  $\mu$ -XRF synchrotron-based spectroscopic studies of atherosclerotic plaques of apoE-knockout mice
- P 29 D. Kusić** (Jena, Germany)  
Rapid classification and identification of pathogenic *Legionella* species in water samples by Raman spectroscopy
- P 30 P. Lasch** (Berlin, Germany)  
Differentiation of hospital-associated and commensal *Enterococcus faecium* isolates using MALDI-TOF mass spectrometry
- P 31 A. Lenzner** (Berlin, Germany)  
Investigation of adverse effects of silver nanoparticles in THP-1 cells by means of FTIR microspectroscopy - concept and preliminary results
- P 32 X. Lin** (Jena, Germany)  
Distinction of nucleobases – a tip-enhanced Raman approach
- P 33 E. Liepic** (Kraków, Poland)  
Application of synchrotron-based FTIR spectroscopy to study DNA damage in single cells irradiated by proton and X-ray microbeams
- P 34 Z. Liu** (Leipzig, Germany)  
Quantification of phytoplankton cell properties from mixed cultures and natural samples by FT-IR spectroscopy using flow cytometry
- P 35 A. Martin** (São Paulo, Brazil)  
Infrared spectroscopy study of *Aggregatibacter actinomycetemcomitans* ATCC 29523, JP2 clone and clinical strains isolated from the human blood

- P 36 A. Matschulat** (Berlin, Germany)  
Synchrotron-based microspectroscopy of human tissue samples at the Metrology Light Source (MLS)
- P 37 N. Mauder** (Fellbach, Germany)  
Differentiation of *Salmonella enterica* serovar Enteritidis strains for vaccination by infrared spectroscopy
- P 38 A. I. Mazur** (Boston, USA)  
The role of fixation in the diagnosis of disease using spectral cytopathology
- P 39 A. I. Mazur** (Boston, USA)  
Screening the oral mucosa in an independent pre-clinical trial for disease diagnosis using infrared micro-spectroscopy
- P 40 S. Meisel** (Jena, Germany)  
Rapid identification of pathogenic milk contaminations
- P 41 J. Monahan** (Boston, USA)  
Raman-active gold nanoparticles as beacons in cervical cancer cells
- P 42 U. Münchberg** (Jena, Germany)  
Oil vesicles in *Mortierellales* – Spatial investigation by means of Raman micro-spectroscopy
- P 43 A. Naumann** (Berlin, Germany)  
*Listeria monocytogenes* in milk biofilms
- P 44 U. Neugebauer** (Jena, Germany)  
Biological variance and statistical variation in the Raman spectra of human cells depending on the origin and the collection time
- P 45 S. Pahlow** (Jena, Germany)  
Magnetic beads for SERS based sequence specific DNA detection
- P 46 M. A. Pleitez** (Frankfurt/M, Germany)  
Infrared spectroscopic analysis of human interstitial fluid *in vitro* and *in vivo* using FT-IR spectroscopy and pulsed quantum cascade lasers (QCL)
- P 47 A. Roth, F. Dornuf** (Frankfurt/M, Germany)  
Reagent-free online monitoring of patient detoxification during hemodialysis using ATR-FTIR spectroscopy
- P 48 L. Schabauer** (Vienna, Austria)  
Identification and differentiation of mastitic associated *Streptococcus* spp. and related bacteria by FTIR – spectroscopy
- P 49 J. Schubert** (Boston, USA)  
Spectral cytopathology: Towards relating spectroscopic changes with their biological source
- P 50 S. Seifert** (Berlin, Germany)  
Surface enhanced Raman scattering on aqueous pollen extracts
- P 51 B. Seise** (Jena, Germany)  
Microstructured optical fiber for pathogen detection via localized surface plasmon resonance sensing and surface enhanced Raman spectroscopy

- P 52 I. Sen** (Ankara, Turkey)  
Effect of obesity on different adipose tissues in inbred obese mouse models: An ATR-FTIR study
- P 53 F. Severcan** (Ankara, Turkey)  
Investigation of bone marrow mesenchymal stem cell properties in patients with beta thalassemia major: FTIR spectroscopy and imaging study
- P 54 S. Stöckel** (Jena, Germany)  
Micro-Raman spectroscopic identification of *Bacillus anthracis*
- P 55 K. Weber** (Jena, Germany)  
Towards reusable SERS arrays in analytical applications
- P 56 D. Whelan** (Melbourne, Australia)  
Monitoring the fully reversible B to A-like DNA transformation in live bacteria cells using FTIR
- P 57 O. Yantorno** (La Plata, Argentina)  
Fourier transform infrared spectroscopy as a tool to evaluate the effect of *Lactobacillus plantarum* supernatant on *Pseudomonas aeruginosa* biofilm development

19:30 - ??                    **Dinner buffet** (at the RKI canteen)  
*in honour of Dieter Naumann*

Friday, October 21st

- 9:00 - 9:20                    **M. Diem** (Boston, USA)  
Spectral cytopathology (SCP): A summary
- 9:25 - 9:45                    **S. Kazarian** (London, U.K.)  
FTIR spectroscopic imaging of live cancer cells
- 9:50 - 10:10                    **Ch. Krafft** (Jena, Germany)  
Tumor cell identification using Raman spectroscopy in combination with optical trapping and microfluidics
- 10:15 - 10:35                    **P. Dumas** (Gif-Sur-Yvette, France)  
Does synchrotron infrared micro-spectroscopy favors some biomedical applications?
- 10:40 - 11:10                    **Coffee Break**
- 11:10 - 11:30                    **E. J. (Swain) Marcsisin** (Boston, USA)  
Optimized methodology for investigating cellular drug response of individual live cells using FTIR micro-spectroscopy

- 11:35 - 11:55 **S. Al-Khaldi** (College Park, USA)  
Identification of food bacterial pathogens using nanoparticle probes and mid-infrared chemical imaging for DNA microarray detection
- 12:00 - 12:20 **D. McNaughton** (Melbourne, Australia)  
FT-IR spectroscopy of *Chromera velia*: Biochemical composition, growth phases and dark incubation
- 12:25 - 12:45 **G. Déléris** (Bordeaux, France)  
Toxicological applications of FT-IR spectroscopy: *in vitro* toxicity of silica nanoparticles on renal cells
- 12:50 - 13:45 **Lunch**
- 13:45 - 14:05 **K. Gerwert** (Bochum, Germany)  
Vibrational micro(spectro)scopy at different scales: Proteins, membranes and living cells
- 14:10 - 14:30 **R. Mendelsohn** (Newark, USA)  
Vibrational microscopic characterization of healing processes in a human skin wound
- 14:35 - 14:55 **P. Heraud** (Melbourne, Australia)  
FTIR spectroscopy discriminates very early stage differentiation in living human stem cells
- 15:00 - 15:30 **Coffee Break**
- 15:30 - 15:50 **A. Kohler** (Ås, Norway)  
High-throughput characterization of metabolic changes in cells
- 15:55 - 16:15 **H. Wagner** (Leipzig, Germany)  
FTIR spectra interpretation of phytoplankton cell spectra and their implications for physiological traits
- 16:20 - ??  
Final Discussion  
Concluding Remarks (**G. Puppels**)

## Aim

The workshop is intended to bring together scientists using and developing infrared and Raman spectroscopic techniques for the analysis of microbial, plant, animal or human cells, tissues, and body fluids. Following the lines of our former workshops in Berlin, a major point of discussion will be FT-IR applications in medical and other fields of microbiology. The aim of the meeting is also to facilitate the exchange of ideas, practical problem solutions and experiences.

## Venue and Time

**Robert Koch-Institute**  
**Nordufer 20, 13353 Berlin, Germany**

**Registration:** October 20, 2011: 8:30 – 9:45

**Beginning:** October 20, 2011: 10:00

**End:** October 21, 2009: 17:15

## Organisation

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