



Workshop

FTIR Spectroscopy in Microbiological and Medical Diagnostics

Robert Koch-Institut, Berlin
October 24-25, 2013

Venue and Time

Robert Koch-Institut
Nordufer 20, 13353 Berlin, Germany

Registration: October 24, 2013: 8:30 – 9:30

Beginning: October 24, 2013: 9:30

End: October 25, 2013: 17:30

Program

Thursday, October 24, 2013

- 09:30 - 09:45 **Opening remarks**
- 09:45 - 10:05 **Antje Hermelink** (Berlin, Germany)
High spatial resolution Raman microspectroscopy – applications in microbiology
- 10:10 - 10:25 **Peter Gardner** (Manchester, U.K.)
The inherent problem of transflection-mode infrared spectroscopic microscopy and the ramifications for single cell analysis

Workshop “FT-IR Spectroscopy in Microbiological and Medical Diagnostics“

- 10:30 - 10:50 **Alexandre Dazzi** (Orsay, France)
Infrared nanoscopy applied to microbiology
- 10:55 - 11:25 **Coffee Break**
- 11:25 - 11:45 **Lawrence D. Ziegler** (Boston, USA)
SERS for biomedical and forensic applications: Monitoring *in vitro* processes of bacteria, human body fluids, and cancer cells
- 11:50 - 12:10 **Janina Kneipp** (Berlin, Germany)
Nano-bio-interactions as revealed by SERS
- 12:15 - 12:35 **Richard A. Dluhy** (Athens, USA)
Novel platforms for SERS-based sensing of infectious disease
- 12:40 - 13:05 **Natalia P. Ivleva** (Munich, Germany)
Raman microspectroscopy and surface-enhanced Raman scattering for biofilm analysis: focus on stable-isotope technique
- 13:10 - 14:00 **Lunch**
- 14:00 - 14:20 **Petra Rösch** (Jena, Germany)
Raman spectroscopic identification of pathogens – A cultivation-free approach
- 14:25 - 14:45 **Agnieszka Kaczor** (Kraków, Poland)
Multi-methodological insight into the tissue: Raman and AFM imaging combined with immunohistochemical staining
- 14:50 - 15:10 **Ute Neugebauer** (Jena, Germany)
Towards culture-independent characterization of pathogens recovered from the urinary tract
- 15:15 - 15:35 **Michael Laue** (Berlin, Germany)
From emergency diagnostics to basic research – electron microscopy in medical microbiology.
- 15:40 - 16:10 **Coffee Break**
- 16:10 - 16:30 **Royston Goodacre** (Manchester, U.K.)
Enhancing Raman spectroscopy for rapid quantitative bioanalysis
- 16:35 - 17:05 **Joachim Heberle** (Berlin, Germany)
SEIRA, SNIM, QCL, UFTIR: Introducing new tools for vibrational biospectroscopy
- 17:10 - 17:30 **Francis L. Martin** (Lancaster, U.K.)
Application of biospectroscopy to characterise cell-specific functionality based on chemical signatures: applications to stem cell biology

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17:30 - 19:30 **Poster Session**

20:00 - ?? **Dinner buffet** (at the RKI canteen)

Poster Session

- P1 V. Artyushenko** (Berlin, Germany)
Fiber coupled FTIR-spectroscopy for biomedical diagnostics
- P2 H. Ayvaz** (Columbus, OH, USA)
Application of infrared spectroscopy for screening acrylamide content in commercial potato chips
- P3 C. Beleites** (Jena, Germany)
Raman-spectroscopic detection of induced drug resistance using a three-level chemometric model
- P4 U.-Ch. Schröder** (Jena, Germany)
A novel combination of dielectrophoresis and Raman spectroscopy for the characterization and identification of bacteria directly in body fluids
- P5 T. Büchner** (Berlin, Germany)
SERS investigations of isolated nuclei
- P6 G. Clemens** (Manchester, U.K.)
Infrared study of single cells in aqueous media
- P7 A. Dazzi** (Orsay, France)
Minimizing contributions from scattering in infrared spectra by means of an integrating sphere
- P8 A. Deniset-Besseau** (Orsay, France)
Subcellular imaging of an estrogen derivative using a single core multimodal probe (SComPI) by luminescence technique and AFMIR
- P9 A. Derenne** (Brussels, Belgium)
FTIR spectral signature of anticancer drugs effect on PC-3 prostate cancer cells: is there any influence of the cell cycle?
- P10 D. Drescher** (Berlin, Germany)
Investigation of nanoparticle-cell interactions by combining SERS with laser ablation ICP-MS and 3D X-ray tomography
- P11 K. Eberhardt** (Jena, Germany)
Monitoring senescence in a human primary fibroblast cell line using Raman micro-spectroscopy
- P12 S.F. El-Mashtoly** (Bochum, Germany)
Label-free imaging of subcellular organelles and distribution of molecular targeted agent in cancer cells
- P13 A. Fanesi** (Leipzig, Germany)
Physiological properties of phytoplankton cells investigated by chemometric analysis of FTIR-spectra

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- P14 I. Freitag** (Jena, Germany)
Surface-enhanced Raman scattering for rapid diagnostics of living tumor cells
- P15 R. Gaifulina** (London, U.K.)
The application of Raman spectroscopy in the investigation of the changes in tissue chemistry caused by variable formalin fixation times
- P16 K. Gajjar** (Lancaster, U.K.)
Blood plasma Fourier transform infrared and Raman spectroscopy for non-invasive detection of ovarian cancer
- P17 K. Gajjar** (Lancaster, U.K.)
Biospectroscopy of cervical cytology *vs.* conventional screening in identification of histology verified cervical intra-epithelial lesions
- P18 K. Gajjar** (Lancaster, U.K.)
Diagnostic segregation of human brain tumours using Fourier-transform infrared and/or Raman spectroscopy coupled with discriminant analysis
- P19 K. Galler** (Jena, Germany)
Hepatic stellate cells and hepatocytes – Raman-based imaging and differentiation
- P20 S. Garip** (Ankara, Turkey)
Epileptic seizure-induced intra-bone structural changes in spines of genetically epileptic rats: a synchrotron-Fourier transform infrared imaging study
- P21 E. Giorgini** (Ancona, Italy)
An FT-IR approach to human granulosa cells
- P22 S. Gok** (Ankara, Turkey)
Quantitative analysis of sodium butyrate induced differentiation of colon cancer cells by FTIR microspectroscopic and computational methods
- P23 E. Goormaghtigh** (Brussels, Belgium)
Infrared imaging in breast cancer: automated tissue component recognition and spectral characterization of breast cancer cells as well as tumor microenvironment
- P24 M. Gühlke** (Berlin, Germany)
SERS micromapping as a tool to analyze the two-dimensional distribution of molecules on nanoparticle arrays
- P25 J.R. Hands** (Preston, U.K.)
Light fantastic: Rapid diagnosis of gliomas via serum spectroscopy
- P26 M.A.B. Hedegaard** (Odense, Denmark)
Mapping of tissue-engineered extracellular matrices (ECMs) for tissue repair using FT-IR spectroscopy
- P27 H.M. Heise** (Bochum, Germany)
Comparison of FTIR-imaging measurements of native colon tissue prepared by cryo-microtoming using transmission and transfection techniques
- P28 M. Hermes** (Jena, Germany)
Inverted microscope for Raman-based cell identification in microfluidic chip environment
- P29 I. Hidi** (Jena, Germany)
Application of lab-on-a-chip surface enhanced Raman spectroscopy (LOC-SERS) in detection of biologically relevant molecules

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- P30 A. Jaworska** (Kraków, Poland)
Monitoring of intracellular environment by SERS and fluorescence
- P31 M. Jimenez-Hernandez** (Manchester, U.K.)
The action of two different chemotherapeutic drugs on a highly resistant cell line analysed as a function of the cell cycle by means of FTIR MS
- P32 M. Joester** (Berlin, Germany)
Combining Raman with scattering methods to study silica in plant materials
- P33 C. Kallepitis** (London, U.K.)
Studying the effect of strontium ions on in-vitro bone mineralization using Raman spectroscopy
- P34 B. Kampe** (Jena, Germany)
Despiking in low to midsize Raman maps using geostatistic modelling
- P35 S. Kloß** (Jena, Germany)
Direct Raman microspectroscopic identification of sepsis relevant pathogens in urine
- P36 P. Kubryk** (Munich, Germany)
Stable-isotope Raman microspectroscopic studies on accumulation of pollutants by biofilms in aquatic systems
- P37 F. Kucuk** (Ankara, Turkey)
Obesity-dependent structural and functional changes in different inbred obese mouse lines of gonadal and inguinal adipose tissues: A Fourier transform infrared imaging study
- P38 V. Kumar** (Jena, Germany)
Chemotaxonomic classification of pigmented microbes in soil using resonance Raman spectroscopy
- P39 D. Kusić** (Jena, Germany)
Raman microspectroscopic characterization of pathogens in planktonic and biofilm state
- P40 W.M. Kwiatek** (Kraków, Poland)
SR FTIR spectroscopy study of the prostate cancer (PC3) cells repair after damage induced by protons
- P41 K. Majzner** (Kraków, Poland)
Raman microspectroscopic investigation on the interaction of endothelial cells with anthracycline antibiotics
- P42 A. Martin** (Sao Jose dos Campos, Brazil)
In vivo investigation in human skin permeability of nanoparticle vitamins formulations using confocal Raman spectroscopy
- P43 V. Merk** (Berlin, Germany)
Templated growth of lithographically patterned nanoparticle arrays for surface enhanced Raman scattering (SERS)
- P44 A. Mignolet** (Brussels, Belgium)
Classification of antitumor polyphenolic compounds by FTIR spectroscopy
- P45 M. Miljkovic** (Jamaica Plain, MA, USA)
ZebraFish – Advanced spectral imaging
- P46 D. Niedieker** (Bochum, Germany)
Annotation of cellular compartments with CARS in combination with fluorescence

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- P47 L. Nolte** (Bielefeld, Germany)
The effect of ventricular assist devices on the membrane elasticity of red blood cells
- P48 E. Oberlander** (Bielefeld, Germany)
Wavelength-specific response of surface-enhanced Raman scattering in nanoparticle dimer structures
- P49 J.E. Oliver** (Preston, U.K.)
Investigating Raman spectroscopy for the diagnosis of brain tumours from serum
- P50 C. Paluszkiwicz** (Kraków, Poland)
Study of human lenses by FTIR spectroscopy
- P51 D. Petersen** (Bochum, Germany)
Detection of the metabolite of molecular targeted agent in colon cancer cells by label-free imaging
- P52 P. Piredda** (Stuttgart, Germany)
Quantitative Raman mapping of nucleic acids in cells and tissues
- P53 A. Ramoji** (Jena, Germany)
Raman spectroscopic investigation of *Candida albicans*' response to neutrophils
- P54 K. Ramser** (Luleå, Sweden)
First clinical study of prostate cancer detection with a dual sensor combining tactile resonance technique with fiber optical Raman spectroscopy
- P55 L.E. Rodriguez-Saona** (Columbus, OH, USA)
A bloodspot-based diagnostic test for fibromyalgia and interstitial cystitis/bladder pain syndromes
- P56 A. Rygula** (Kraków, Poland)
Raman spectroscopy and AFM for physico-chemical imaging of the “en face” aorta in liquid and air
- P57 S. Sabbatini** (Ancona, Italy)
FTIR Microspectroscopy of Spitz Nevi: A preliminary study
- P58 S. Seifert** (Berlin, Germany)
Characterization and classification of aqueous pollen extracts using SERS and multivariate statistics
- P59 F. Severcan** (Ankara, Turkey)
FTIR spectroscopy and imaging in ionizing radiation and radiation protection monitoring: Application to biomedical and food sciences
- P60 E. Staniszewska-Slezak** (Kraków, Poland)
Capability of Fourier transform infrared spectroscopy in early recognition of systemic and pulmonary hypertension in blood plasma
- P61 C. Stiebing** (Jena, Germany)
Live cell imaging of macrophages incubated with deuterated fatty acids using Raman microscopy
- P62 T. Tolstik** (Jena, Germany)
Random Forest classification of Raman spectra for reliable diagnosis of hepatocellular carcinoma

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- P63 L. Tomasello** (Verona, Italy)
IR analysis of leukemic cells transduced with an oncosuppressive protein tyrosine phosphatase by HIV-1 Tat technology
- P64 L. Vaccari** (Trieste, Italy)
Cellular progression and death: A comparison of spectroscopic and cytofluorimetric signatures
- P65 H. Wagner** (Leipzig, Germany)
Biochemical traits of plant cells measured by FTIR spectroscopy
- P66 N. Wald** (Brussels, Belgium)
Histological characterization of melanoma metastases by FTIR imaging
- P67 D.R. Whelan** (Clayton, Victoria, Australia)
Changes to the conformation and concentration of DNA detected using Fourier transform infrared spectroscopy
- P68 K. Wilcox** (Manchester, U.K.)
The determination of protein secondary structure from Fourier transformation infrared red (FTIR) spectra using partial least square (PLS) regression
- P69 T.P. Wrobel** (Kraków, Poland)
Electric field standing wave effects in FT-IR transfection spectra of biological tissue sections
- P70 O. Yantorno** (La Plata, Argentina)
Phenotypic characterization of biofilms formed by *Bordetella pertussis* clinical isolates by FT-IR spectroscopy
- P71 H.K. Yosef** (Bochum, Germany)
Detection of cancer cells response to EGFR inhibitors by Raman spectral imaging
- P72 A.Y.F. You** (London, U.K.)
Raman and nano-analytical electron microscopy characterisation of human cardiovascular tissue calcification in disease
- P73 I. Zeise** (Berlin, Germany)
Silica particles with plasmonic silver cores for applications in eukaryotic cells

Friday, October 25, 2013

- 09:00 - 09:20 **Werner Mäntele** (Frankfurt/Main, Germany)
Mid-IR spectroscopy in medical diagnostics using tunable quantum cascade lasers: A complement or a competition to FT-IR-Spectroscopy?
- 09:25 - 09:45 **Christoph Krafft** (Jena, Germany)
Progress in cell identification using Raman spectroscopy in combination with optical trapping and microfluidics

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- 09:50 - 10:10 **Jörg Rau** (Fellbach, Germany)
Application of spectroscopic methods in a food control and animal health laboratory
- 10:15 - 10:35 **Richard Mendelsohn** (Newark, NJ, USA)
IR spectroscopy and imaging in skin biophysics: barrier formation kinetics and lateral diffusion across the stratum corneum
- 10:40 - 11:10 **Coffee Break**
- 11:10 - 11:30 **Bayden Wood** (Clayton, Victoria, Australia)
Towards a rapid Malaria detection & quantification system using attenuated total reflectance infrared (ATR-FTIR) spectroscopy
- 11:35 - 11:55 **Matthew J. Baker** (Preston, U.K.)
Spectroscopic investigations of surface deposited bacterial BW simulants
- 12:00 - 12:20 **Alejandra Bosch** (La Plata, Argentina)
Insights into *Burkholderia cepacia* complex long-term infections through FT-IR spectroscopy
- 12:25 - 12:45 **Mustafa Kansiz** (Mulgrave (Melbourne), Australia)
A new approach to achieving ultra-high spatial resolution FTIR imaging – A biomedical tissue case study
- 12:50 - 13:45 **Lunch**
- 13:45 - 14:05 **Magali Verdonck** (Brussels, Belgium)
FTIR imaging as a new tool to characterize immune cells in various biological tissues: focus on secondary lymphoid organs and breast tumor infiltrating lymphocytes
- 14:10 - 14:30 **Sara Akkas** (Ankara, Turkey)
A novel approach to aquatic ecotoxicology: applications of FTIR spectroscopy
- 14:35 - 14:55 **Phil Heraud** (Clayton, Victoria, Australia)
New approaches to understanding ecosystem dynamics in the Southern Ocean involving phytoplankton using FTIR spectroscopy
- 15:00 - 15:30 **Coffee Break**
- 15:30 - 15:50 **Michael C. Martin** (Berkeley, USA)
3D spectral imaging of biological samples with synchrotron FTIR spectro-microtomography

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- 15:55 - 16:15 **Hoi-Ying Holman** (Berkeley, USA)
Synchrotron FTIR spectral microscopy reveals functional response of deep-sea microorganisms to the gulf of Mexico oil spill
- 16:20 - 16:40 **Sergei Kazarian** (London, U.K.)
Recent advances in FTIR spectroscopic imaging in transmission
- 16:45 - 17:05 **Max Diem** (Boston, USA)
Medical diagnosis by infrared spectral cytopathology (SCP)
- 17:10 - 17:30 **Final Discussion, Concluding Remarks**

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.

Organization

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Sponsoring

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