BOOK OF ABSTRACTS

Developments and trends in (multi)mycotoxin detection

ANALYSIS, the third and final in the series of virtual pre-conferences preceding WMF*meets*ITALY, the in-person conference of The World Mycotoxin Forum®, 16-18 May 2022, Parma, Italy

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THE WORLD MYCOTOXIN FORUM® *CONNECTS*

The World Mycotoxin Forum® is the leading international meeting series on mycotoxins dedicated to assembling the world's best minds across the spectrum of integrated strategies ensuring the safety and security of the food and feed supply chain. **The World Mycotoxin Forum®** brings together a holistic conference programme covering the latest issues in mycotoxin management and is targeted at everyone working in the mycotoxin space - researchers, food and feed industry, laboratories, policy makers, and enforcement agencies from around the world.

Since the previous conferences of **The World Mycotoxin Forum®** in Belfast (October 2019) and in Bangkok (January 2020), the world has changed due to the COVID-19 outbreak. We haven't met each other for quite while but the "Times they are a- (hopefully) changin" (to paraphrase the legendary singer-songwriter Bob Dylan). Therefore, we are happy to announce that the 13th conference of **The World Mycotoxin Forum®** – WMF*meets*Italy – takes place IN-PERSON again. Mark your calendar: 16-18 May 2022, Parma, Italy.

What's happening in the meantime? In the run-up to the in-person conference, **The World Mycotoxin Forum®** will present virtually three one-day pre-conferences focusing on specific mycotoxin topics to keep you informed and connected:

- Human exposome, 12 October 2021
- Animal health, 30 November 2021
- Analysis, 1 February 2022

These three pre-conferences will be held on a highly interactive platform with great networking opportunities.

The General Conference Chairs – Prof. Rudolf Krska and Prof. Chris Elliott – and the members of the Steering Committee and the Advisory Committee are looking forward to getting you informed and connected.

See you in the cloud for the three pre-conferences and in Parma for the in-person event!

Rudolf Krska
Chris Elliott
General Conference Chairs

PROGRAMME

All times are in Central European Time (CET)

12:00 **The World Mycotoxin Forum® *Connects***
General conference chairs: Prof. Rudolf Krska, Department IFA-Tulln, BOKU Vienna, Austria and Prof. Chris Elliott, Institute for Global Food Security, Queen's University of Belfast, UK

12:15 *Mycotoxin analysis – ranging from rapid methods to advanced instrumental techniques*
Pre-conference chair: Prof. Rudolf Krska

12:25 *Begin with the end in mind: a focus on pre-analytical and post-analytical challenges in mycotoxin testing*
Ronald Niemeijer, R-Biopharm, Germany

12:50 *Validation of LC-MS/MS based multi-analyte methods – the issue of replicates*
Dr Michael Sulyok, Department IFA-Tulln, BOKU Vienna, Austria

13:15 *Multi-residue analysis of mycotoxins in freshwater and occurrence in amphibian breeding ponds*
Dr Tess Goessens, Department of Pathology, Pharmacology & Zoological Medicine, Ghent University, Belgium

13:40 *Potential of ion mobility-mass spectrometry to improve analytical performance in the determination of ergot alkaloids in cereal samples*
Dr Laura Carbonell-Rozas, Department of Analytical Chemistry, University of Granada, Spain

14:05 Company pitches

- *Removing the fear: Simple tools offering precise results*
  Lanny Smith, VICAM, USA
- *Rapid test methods and automation: flexible and cost-effective mycotoxin screening solutions from Eurofins Technologies*
  Giulia Rosar, Eurofins Technologies, Italy
- *Advantages of the use of ^{13}C fully labelled internal standards to improve your mycotoxins analysis by LC-MS/MS*
  Boutros Kerbaje, Libios, France
- *Testing on-site does not need to be slow or complicated*
  Nora Kogelnik, Romer Labs, Austria

14:30 **EXHIBITION:** Visit the booths and live chat with our sponsors.
PIAZZA CONNECTS: Meet & Greet the chairs, the speakers and the WMF community.

15:00 *Bridging the gap between massive on-site mycotoxin testing and confirmatory instrumental analysis*
Ariadni Geballa-Koukoula, Wageningen Food Safety Research, the Netherlands

15:25 *Mycotoxin monitoring solutions for prevention, management, and compliance*
Nicola Dreolin, Waters Corporation, USA

15:50 *Rapid methods to screen for T-2 and HT-2 toxins*
Dr Natasha Logan, School of Biological Sciences, Queen's University Belfast, Northern Ireland

16:15 *Single kernel mycotoxin analysis in commercial maize: Spectral identification, distributions, and sorting*
Dr Matthew J. Stasiewicz, Department of Food Science and Human Nutrition, University of Illinois at Urbana-Champaign, USA

16:40 *Mycotoxin detection in grains and nuts using optical imaging and spectroscopic techniques*
Prof. Chandra B. Singh, Advanced Postharvest Technology Centre, Lethbridge College, Canada and UniSA STEM, University of South Australia, Australia

17:05 *Can photonics hunt the cereal killer?*
Prof. Boris Mizaikoff, Institute of Analytical and Bioanalytical Chemistry, Ulm University and Hahn-Schickard, Institute for Microanalysis Systems, Germany

17:30 Closing remarks by Prof. Rudolf Krska and Prof. Chris Elliott

17:45 Outlook for WMF*meets*ITALY, 16-18 May 2022, Parma, Italy
Prof. Michele Suman and Prof. Chiara Dall'Asta

18:00 End of pre-conference

ABOUT THE SPEAKERS

Ronald Niemeijer
Ronald Niemeijer is director global marketing at R-Biopharm AG in Darmstadt, Germany. He is also a member of the MicroVal General Committee and the Board of AOAC Europe. Before joining R-Biopharm, he held positions in sales and product development at companies, such as ALControl Laboratories and Unilever.

Michael Syulyok
Dr Sulyok specialises on LC-MS/MS based methods for the simultaneous determination of mycotoxins and fungal metabolites with a strong focus on method validation to characterise their performance with minimal or even no sample clean-up. His research has resulted in numerous international cooperations, more than 290 papers and the award of the Clarivate Highly Cited Researcher in 2018 and 2019.

Tess Goessens
Dr Goessens is a scientific researcher at Ghent University. Her PhD thesis dealt with 'Screening of agrochemicals in fresh water ecosystems and organ-specific bioaccumulation and elimination of fungicides in the Japanese red-bellied newt, *Cynops pyrroghaster*'.

Laura Carbonell-Rozas
Dr Carbonell-Rozas holds a PhD in Chemistry at the University of Granada. She has collaborated with different high quality R&D centers during several international stays. Currently, she is part of the Food and Drug Department at the University of Parma as a Post-Doctoral research scientist.

Ariadni Geballa-Koukoula
Ariadni Geballa-Koukoula a licensed pharmacist with an MSc in Pharmaceutical Analysis from the University of Athens. Currently, she is a PhD candidate at Wageningen University. Her thesis objective is method development for coupling bioassays and biosensing alternatives with direct mass spectrometry.

Nicola Dreolin
Nicola Dreolin is a senior scientist and natural toxins subject matter expert at Waters. Nicola is specialised in method development for a variety of food and environmental applications. He is currently involved in different research projects regarding metabolomics, ion mobility, and direct-mass spectrometry for food testing and authenticity.

Natasha Logan
Dr Logan is an active member of Prof. Chris Elliott's research team at the Institute for Global Food Security and involved in numerous food safety and food fraud related projects, grant applications, publications and patents. Her research interests focus on food safety applications and the development of novel and portable spectroscopy techniques to detect food contaminants in-field.

Matthew Stasiewicz
Dr Stasiewicz is an assistant professor of Applied Food Safety in the Department of Food Science and Human Nutrition at the University of Illinois at Urbana-Champaign. His work focuses applying engineering and data analytic approaches to advance food safety microbiology.

Chandra B. Singh
Dr Singh is Senior Research Chair in Agricultural Engineering and Technology at the Lethbridge College in Alberta, Canada. He is developing the Advanced Postharvest Technology Centre at the college. He conducts research on postharvest storage and handling of grains, sugar beets and potatoes, natural air drying, aeration, mathematical modelling, sensing, automation, machine learning, and non-destructive quality evaluation of agri-food products using NIR hyperspectral imaging.

Boris Mizaikoff
Dr Mizaikoff is a Chaired Professor and Director of the Institute of Analytical and Bioanalytical Chemistry, Ulm University, Germany. Since 2021, he is also a Director at the Hahn-Schickard Institute for Microanalysis Systems in Ulm. His research interests focus on optical sensors, biosensors, and biomimetic sensors in the mid-infrared spectral range, among others.

LECTURES

BEGIN WITH THE END IN MIND: A FOCUS ON PRE-ANALYTICAL AND POST-ANALYTICAL CHALLENGES IN MYCOTOXIN TESTING

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The progress made in mycotoxin analysis and analytical methods is impressive. Mycotoxin testing has become faster, more comprehensive and more automated. The use of mobile devices in mycotoxin analysis and sharing the analytical data in the cloud has opened entirely new ways of mycotoxin data use. Yet it is important to keep in mind that the quality of the final result is largely depending upon pre-analytical steps like sampling methods, sample preparation as well as post-analytical steps like quality assurance and data interpretation.

With “Begin with the end in mind” I will highlight some aspects, such as sample grind size, the amount of sample extracted and the effect on the quality of the analytical results. In addition, I will share some of the experiences of a high-volume testing, ISO 17025 accredited mycotoxin testing laboratory how to tackle challenges with respect to quality assurance.

VALIDATION OF LC-MS/MS BASED MULTI-ANALYTE METHODS – THE ISSUE OF REPLICATES

Michael Sulyok

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Most of the guidelines that are available on proper method validation have been designed for assays targeting only one or very few analytes, which often includes removal of the sample matrix by a dedicated clean-up procedure. This option is not feasible for LC-MS based methods covering a broad range of target substances with different chemical properties. **Consequently**, a considerable amount of matrix is co-injected with the analytes, which is known to influence their ionisation in the source of the mass spectrometer and thus the analytical signal.

LC-MS specific validation guidelines recommend **using** stable isotope labelled internal standards or matrix matched calibration to compensate for those so-called matrix effects. However, it might not be the absolute extent of matrix effects in a given matrix but rather their variation between different individual samples (= relative matrix effects) that are the main limitation for the performance of an LC-MS based multi-method, as these sample-to-sample variations cannot be compensated by calibration matched to extracts deriving from a single sample.

Validation data that we have obtained for various agricultural commodities indicates that a significant fraction of the method uncertainty derives from relative matrix effects, indicating that there is the need for an additional effort to characterise them as an essential part of the validation process. This is not foreseen in current guidelines and might lead to an underestimation of the methods uncertainty.

MULTI-RESIDUE ANALYSIS OF MYCOTOXINS IN FRESHWATER AND OCCURRENCE IN AMPHIBIAN BREEDING POND

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Mycotoxins are known for their negative impact on human and animal health as they frequently contaminate food and feed products from crop origin that are consumed by humans and animals. Furthermore, mycotoxins can leach out of plant tissue, to be transported through runoff water into nearby ponds where they can exert negative effects on aquatic organisms, such as fish, amphibians, and zooplankton.

The overall goal of this study was to develop an SPE-UHPLC-MS/MS method for the detection and quantification of multiple mycotoxins in amphibian breeding ponds. The method was validated and yielded acceptable within-run and between-run apparent recoveries and precision, as well as good linearity. Matrix effects (i.e., 75.7–109.6%, ≤ 17.8% RSD) were evaluated using water from 20 different ponds in Flanders, Belgium. By incorporating internal standards, overall results improved and adequate precision values (i.e., ≤ 15%) were obtained according to the EMA guideline. Additionally, extraction recovery (n=3) was evaluated, yielding good results for all mycotoxins (i.e., 75.3–109.1%, ≤15% RSD), except for AME (i.e., 6.7 ± 0.7%), which implied the need for a matrix-matched calibration curve. Detection sensitivity was in the low nanograms per litre range. Storage stability experiments indicated that sample storage at 4 °C in amber glass bottles and analysis performed within 96 h after sampling was sufficient to avoid loss by degradation for all compounds, excluding β-zearalanol (β-ZAL) and β-zearalenol (β-ZEL), for which analysis within 24 h is more indicated.

The method was successfully applied to water samples originating from 18 amphibian breeding ponds situated across Flanders. Overall, enniatins B, B1 and A1 were most commonly detected at maximum concentrations of 6.9, 3.3 and 2.6 ng/l, respectively, followed by detection of beauvericin (1.1 ng/l and < 1 ng/l), alternariol monomethyl ether (< 10 ng/l), HT-2 toxin (< 40 ng/l), zearalenone (< 25 ng/l), and α-zearalanol (< 10 ng/l). We believe that this method will boost further research into the dynamics and ecotoxicological impact of mycotoxins in aquatic environments.

POTENTIAL OF ION MOBILITY-MASS SPECTROMETRY TO IMPROVE ANALYTICAL PERFORMANCE IN THE DETERMINATION OF ERGOT ALKALOIDS IN CEREAL SAMPLES

Laura Carbonell-Rozas[1,2], M. Hernández-Mesa[1,2], L. Righetti[3], F. Monteau[2], F.J. Lara[1], L. Gámiz-Gracia[1], B. Le Bizec[2], C. Dall'Asta[3], A.M. García-Campaña[1] and G. Dervilly[2]

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[2] Oniris, INRAE, LABERCA, France.
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Ergot alkaloids (EAs) are mycotoxins produced mainly by fungi of the *Claviceps* genus, common in cereals whose ingestion can cause human and animal poisoning. Their simultaneous determination with current liquid chromatography-mass spectrometry (LC-MS) methods is challenging as most of these compounds are epimers and show similar retention times and an identical mass-to-charge ratio (*m/z*).

This communication shows the advantages provided by the integration of travelling wave ion mobility spectrometry (TWIMS) into LC-MS workflows focused on the determination of EAs. Analytical performance is mainly improved in terms of higher separation resolution and concentration sensitivity, leading to a greater confidence in analyte identification [1]. In this regard, taking advantage of the third dimension offered by TWIMS, which provides the measurement of the rotationally averaged collision cross section (CCS), the first $^{TW}CCSN_2$ database for the main EAs has been built to support their unequivocal identification. The generated CCS database was successfully inter-laboratory cross-validated (bias < 2 %) and compared with CCS values predicted by machine-learning models (bias < 5 %). Slight differences in the experimental CCS values obtained for ergotamine, ergosine and ergocristine and their corresponding epimers (ΔCCS/CCS between 3.3 and 4 %), were sufficient to achieve peak-to-peak resolution in the TWIMS dimension. In addition, a LC-TWIM-MS method was applied to the analysis of the main EAs in cereal samples. The integration of TWIMS into the LC-MS workflow allowed the separation and isolation of target compounds from the background noise and co-eluting matrix interferences. The signal-to-noise ratio (S/N) was increased between 2.5 and 4-fold compared to the analogue LC-MS method; therefore, signal sensitivity was improved. Furthermore, cleaner mass spectra were observed in the TWIMS dimension. Finally, contaminated samples were determined, whose total EA content ranged from 8.3 to 36.8 µg/kg for barley samples and from 5.2 to 65.0 µg/kg for wheat samples. These contents were below the maximum level recently set by the European Commission for total EAs (150 µg/kg) in these cereals [2].

References

1. Hernández-Mesa et al., 2017. Trends in Analytical Chemistry 94: 39–53.
2. Commission Regulation (EU) 2021/1399 of 24 August 2021. Official Journal of the European Union L301: 1-5

Acknowledgements

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BRIDGING THE GAP BETWEEN MASSIVE ON-SITE MYCOTOXIN TESTING AND CONFIRMATORY INSTRUMENTAL ANALYSIS

Ariadni Geballa-Koukoula[1], A. Gerssen[1] and M.W.F. Nielen[1,2]

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[2] Laboratory of Organic Chemistry, Wageningen University & Research, the Netherlands

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Lateral flow immunoassays (LFIAs) are widely used for rapid food safety screening analysis. Thanks to simplified protocols and smartphone readouts, LFIAs are expected to be increasingly used on-site, even by non-experts. As a typical follow-up in EU regulatory settings, suspect samples are sent to laboratories for confirmatory analysis by liquid chromatography-tandem mass spectrometry (LC-MS/MS). However, re-analysis by LC-MS/MS is laborious and time-consuming.

In this work, an identification LFIA (ID-LFIA) approach followed by quadrupole-orbitrap MS or triple quadrupole MS/MS analysis is presented. As a proof of concept, a dedicated ID-LFIA strip was developed for the mycotoxin deoxynivalenol (DON) following its initial screening by a commercial smartphone LFIA. The ID-LFIA strip can be simply immersed in the same sample extract used for the smartphone LFIA screening, and next, DON is retrieved from the monoclonal antibody with a dissociation solution consisting of methanol/ammonia. The solution thus obtained was analysed directly in electrospray ionization or direct analysis in real time mass spectrometry to rapidly confirm the presence of DON and any cross-reacting species. The protocol developed is capable of coping with severe ion suppression caused by LFIA buffers and nitrocellulose substrate residues. Analysis of blank, spiked, and incurred samples showed that the newly developed ID-LFIA-MS method was able to confirm the presence or absence of mycotoxins in the samples previously analysed by LFIA and also differentiates between DON, acetyl-DON and DON 3-glucoside yielding the positive screening result. The concept and technique developed are envisaged to complement on-site screening and confirmation of any low molecular weight contaminant, including mycotoxins, in future food control frameworks.

Acknowledgments
This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Sklodowska-Curie grant agreement No 720325.

MYCOTOXIN MONITORING SOLUTIONS FOR PREVENTION, MANAGEMENT, AND COMPLIANCE

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Food safety initiatives are increasingly focused on prevention. For mycotoxins, this means more upstream monitoring at harvest, point of purchase, prior to storage or processing and for export shipment release. Qualitative and quantitative lateral flow strips are an essential tool for the rapid test of raw materials, processed or intermediate products. At the same time, instrumental methods are no longer just employed to confirm suspect positive results from screening methods but as a primary tool for determination.

The increase in the use of LC-MS/MS for mycotoxin testing has reduced the reliance on immunoaffinity chromatography (IAC) columns for clean-up but the combination of IAC and LC with optical detection remains a popular, cost-effective option for the determination of selected groups of mycotoxins, such as aflatoxins. IAC columns are often still used with LC-MS/MS when low LODs are required (e.g., OTA and AFB1 in baby food) and/or the commodity is a complex matrix. On the other hand, for the determination of a large number of mycotoxins in challenging matrices, the employment of the pass-through SPE clean-up can enhance the robustness of the LC-MS/MS method, providing positive return on investment. Here, we present the Waters and VICAM portfolio of products, which can support you in all stages of the food and feed production chain, from field to lab.

RAPID METHODS TO SCREEN FOR T-2 AND HT-2 TOXINS IN CEREALS

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One of the greatest challenges to the agri-food sector globally is the contamination of cereal crops with mycotoxins, naturally occurring toxic secondary metabolites of filamentous fungi. To date, a number of these harmful metabolites have been well characterised, are known to pose serious health risks to the human population and have been regulated in many parts of the world. Natural contamination of cereal grains with fungal pathogens, both pre- and post-harvest is a continuing and growing problem worldwide as many of these fungal species produce mycotoxins that have serious implications for human and animal health. Of the hundreds of mycotoxins identified, only eleven have been legislated for human food and animal feed and include aflatoxins, fumonisins, ochratoxin A, zearalenone, deoxynivalenol, T-2 and HT-2 toxin. Production of these natural toxins are determined by specific environmental and management conditions, and climate change is expected to continue to drive contamination of these crops, necessitating greater surveillance and control to safeguard the food chain.

There are many diagnostic test kits commercially available for the regulated mycotoxins, the majority of which are immunoassays. The aim of this presentation is to discuss the current rapid methods used for the detection of T-2 and HT-2 toxins in cereals including, commercially available test kits (e.g., enzyme linked immunosorbent assays, lateral flow devices and fluorescence polarization immunoassays). Additionally, rapid techniques with the potential to screen for T-2 and HT-2 toxins on-site in the future, such as spectroscopy-based techniques (e.g., near infrared spectroscopy, hyperspectral imaging and surface-enhanced raman spectroscopy) will be discussed. Advantages, problems, and challenges for each technique will be evaluated. Finally, recommendations will be made on rapid immunological and spectroscopy-based techniques. It is clear, however, that alongside confirmatory analysis, advances in rapid screening techniques are crucial and all can play an important role in fighting mycotoxin contamination within the food and feed industry.

SINGLE KERNEL MYCOTOXIN ANALYSIS IN COMMERCIAL MAIZE: SPECTRAL IDENTIFICATION, DISTRIBUTIONS, AND SORTING

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Our group has a long-standing interest in using the fact that mycotoxins often skew towards only a few kernels in a lot containing most of the toxin, as an opportunity to improve management. Our long-term goal is to develop both single kernel real-time testing and single kernel optical sorters, particularly for limited-resource settings. This talk will describe the progression of that work from Kenya, the USA, and Ghana.

In our work in Kenya, we found that we could calibrate a relatively low-cost UV-visible-NIR sorter to reject kernels that tested high in aflatoxin or fumonisin. This achieved about 80% sensitivity and specificity, would reject a median of 5% of maize from bulk lots contaminated with both toxins, and reduced concentration in accept streams by an average of ~80% compared to reject streams (with high variability). Along the way, we developed distributions that confirm high skew in aflatoxins and fumonisins at a single kernel level and validated single kernel risk factors for contamination. In our work in the US, we developed a high-resolution UV-visible-NIR reflectance and fluorescence spectroscopy system. We used this to gather data on 9 lots of commercial maize from Texas that had previously tested high in aflatoxin, fumonisin, both toxins, or neither. Testing single kernels from these lots further confirmed high skewness towards few kernels containing high toxin levels. We used the single kernels masses to further calculate the relative contribution of each kernel to the total aflatoxin or fumonisin mass in the sample (still very skewed) and used those calculations to predict the bulk toxin assay values (variable, but unbiased). Classification performance was close to previous work. Finally, we have extended these approaches by calibrating our low-cost UV-visible-NIR sorter to identify kernels with visible features associated with mycotoxin contamination. This algorithm does reduce mycotoxin concentration in maize from Ghanaian poultry farms. Specifically, it removes a median of around 10% of the sample, while removing around 40% of the total aflatoxin and 90% of the total fumonisin. One general caveat to all these general trends is that mycotoxin values are highly variable, and so, all these data have large associated variabilities and future work needs to replicate these findings beyond laboratory scales of 100s of grams to pilot scales in the order of 10s of kgs.

MYCOTOXIN DETECTION IN GRAINS AND NUTS USING OPTICAL IMAGING AND SPECTROSCOPIC TECHNIQUES

Chandra B. Singh, G. Mishra and B. Panda

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Food safety is gaining utmost attention due to increased consumer awareness and tightening government regulations for very low tolerance of food contamination. Mycotoxins are major contaminants found in grains and nuts and pose a serious health risk to humans. Chromatographic methods are the most accurate and commonly used by the agri-food industry, but these are destructive, slow, and expensive. Agri-food industry is looking for alternative rapid, accurate, and non-destructive mycotoxin detection technique. Several optical imaging and spectroscopic techniques have been investigated. Near-infrared (NIR) spectroscopy, fluorescence spectroscopy, and NIR hyperspectral imaging have shown good promise for non-destructive mycotoxin detection in grains and nuts.

CAN PHOTONICS HUNT THE CEREAL KILLER?

Boris Mizaikoff[1,2]

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Photonic technologies have seen revolutionary developments in the past decades leading from conventional optics to on-chip photonic devices. Owing to the recent advances in mid-infrared (3-15 µm; MIR) laser technology, especially cascade laser spectroscopy (CSL) has evolved into a state-of-the-art tool for the selective and sensitive quantification of trace analytes in liquid, solid, and gaseous state in a wide variety of sensing scenarios. High output power, narrow linewidths, single-mode operation, low power consumption, broad tunability and compact dimensions are just some of the most outstanding features of cascade lasers. Since their introduction, quantum cascade lasers (QCL) and interband cascade lasers (ICL) have rapidly matured and have established themselves as the probably most important contemporary MIR laser light sources.

In this presentation, we will discuss state-of-the-art MIR sensing platforms that benefit from cascade lasers via their combination with innovative thin- film waveguide technologies providing direct access to molecule-specific information using evanescent field sensing schemes at yet unprecedented levels of sensitivity. 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. We will discuss the resulting consequences and strategies for a particularly relevant example, i.e., the detection of fungal infection and resulting mycotoxin contamination at commodities and cereals via MIR photonic sensing systems … and we will answer the question as to whether photonic technologies are indeed able to hunt a cereal killer!

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COMPANY PITCHES

REMOVING THE FEAR: SIMPLE TOOLS OFFERING PRECISE RESULTS

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RAPID TEST METHODS AND AUTOMATION: FLEXIBLE AND COST-EFFECTIVE MYCOTOXIN SCREENING SOLUTIONS FROM EUROFINS TECHNOLOGIES

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ADVANTAGES OF THE USE OF ^{13}C FULLY LABELLED INTERNAL STANDARDS TO IMPROVE YOUR MYCOTOXINS ANALYSIS BY LC-MS/MS

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