

## **TU Wien - Webinar Details**

**Date:** July 14<sup>th</sup>, 2020

**Time:** 10:00 AM EDT

**Presenter(s):** Dr. Karin Wieland

**Position:** Postdoctoral researcher at Chair of Analytical Chemistry

**Organization:** TU Munich, Institute of Hydrochemistry

**Presenter(s):** Prof. Dr. Bernhard Lendl

**Position:** Head of Research Division “Environmental Analytics, Process Analytics and Sensors”

**Organization:** TU Wien, Institute of Chemical Technologies and Analytics

**Webinar Facilitator:** Dr. Carsten Uerpmann

**Position:** Business Industry Manager

**Organization:** Kaiser Optical Systems, Inc.

### **Webinar Title:**

In-line ultrasound-enhanced Raman spectroscopy

### **Registration Link:**

**Keywords:** (related to the talk)

Raman spectroscopy

Ultrasonic particle manipulation

In-line monitoring

Stirred suspensions

**3 Take-aways:** (what will the attendee learn?)

1. Theoretical introduction to ultrasonic particle manipulation
2. How the combination of Raman spectroscopy and ultrasonic particle manipulation allows to improve the LOD of in-line Raman spectroscopy by a factor of  $\approx 30$
3. How an optimized geometrical arrangement allows to selectively investigate either the solid or liquid phase of stirred suspensions

### **Abstract:**

Raman spectroscopy is a non-destructive characterization tool for gaseous, liquid and solid samples. However, the low cross-section of inelastically (Raman) scattered light imposes a major drawback for in-line process control in terms of sensitivity. Leveraging

ultrasonic particle manipulation combined with in-line Raman spectroscopy, an add-on for Raman probes was designed to overcome this limitation. The final prototypes feature two different geometries and are fabricated out of 1.4404 stainless steel to fit a D25 Ingold port ensuring FDA-compatibility for unrestricted use in process analytical technology (PAT). The geometrical arrangement of acoustic wave and Raman laser propagation ensures particle concentration in the focus of the Raman probe increasing the Raman sensitivity by a factor of  $\approx 30$ . The audience will also be introduced to a refined geometry which adds selectivity to in-line Raman sensing as it allows to either investigate the liquid or solid phase of stirred suspensions. The webinar will end with a few applications examples showcasing the performance of ultrasound enhanced Raman spectroscopy in a process analytical setting.

### **Short bio:**

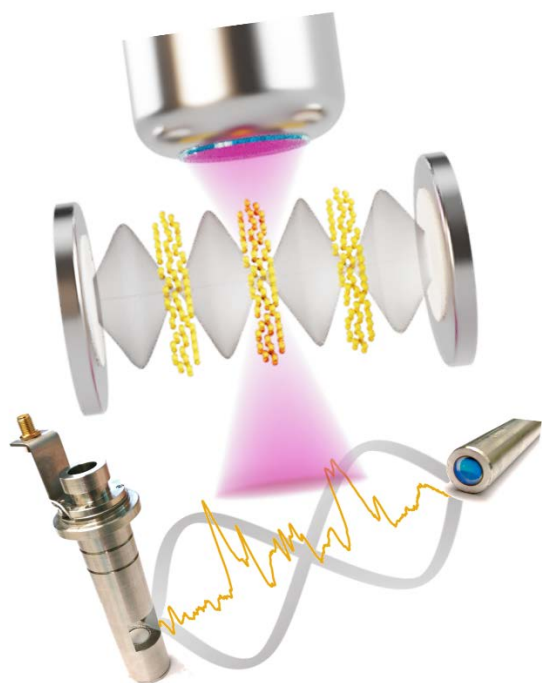
Dr. Karin Wieland is a postdoctoral researcher at the Chair of Analytical Chemistry, TU Munich. Her research focus is the application and optimization of vibrational spectroscopic methods along with chemometric data analysis. She received her M.Sc. degree with specialization in biotechnology and bioanalytics from TU Wien (TUW) in 2014 and her PhD degree in Technical Chemistry (TUW) in 2019. During her time in Bernhard Lendl's group at TUW, she applied Raman and infrared spectroscopy for imaging and characterization of biological samples at the micro- and nanoscale. Besides of nanoscale imaging of drug-containing nanocarriers by means of photothermal induced resonance (PTIR) spectroscopy, she was working on the combination of Raman spectroscopy with ultrasonic particle manipulation for increased in-line sensing sensitivity and selectivity in process analytical technology (PAT) applications.

Prof. Bernhard Lendl heads the research division on environmental analytics, process analytics and sensors at TU Wien, Austria. He received his PhD degree in Technical Chemistry from TUW in 1996. In 2001, he became associate professor at TUW. During a sabbatical period in 2003-2004, he worked as guest professor at the Universidad de Córdoba in Spain. In 2008, he founded the TUW high-tech spin-off company QuantaRed Technologies GmbH, a leading manufacturer of quantum cascade laser-based analyzers of liquids. In 2016, Bernhard Lendl was appointed full professor for Vibrational Spectroscopy at TUW. His research focuses on advancing analytical sciences through the development of novel analytical techniques and instrumentation based on infrared and Raman spectroscopy and their application to environmental and process analytical chemistry, material characterization as well as bio-medical diagnostics.

### **Speaker Professional Headshot:**



**Supporting images:** (1 or 2 images for use in promo materials)



**External links / Additional Resources:** (relevant content to be shared with registrants in the follow-up email)

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