

## Conference Review: 15<sup>th</sup> Confocal Raman Imaging Symposium

**The Confocal Raman Imaging Symposium, which took place for the 15<sup>th</sup> time in Ulm, was like a big family reunion with both familiar and new faces. The Ulm-based microscope manufacturer WITec invited researchers, engineers and scientists to discuss the latest developments in confocal Raman microscopy from September 24<sup>th</sup>-26<sup>th</sup>, 2018.**

With over 100 participants from many countries, attendance at the international conference was strong again this year. For years, experts and beginners have been taking the opportunity to refresh and expand their knowledge of modern Raman microscopy. There were plenty of opportunities to do so in lectures and poster sessions, as well as directly with other attendees. Well-known speakers from academia and industry informed the audience about research results in their respective fields. In addition, the participants were able to present their work through posters and discuss it with each other. The program was supplemented by demonstrations of the latest confocal Raman microscopes. The evening lecture was given by the science comedian and physicist Vince Ebert, who entertained the international audience with precise and observant humor.

At the beginning of the Symposium, Sebastian Schlücker (University Duisburg-Essen, Germany) gave a lecture on the theoretical basics of Raman spectroscopy and provided insights into special Raman techniques that increase the resolution and amplification of the Raman signal. Schlücker then let the audience test their knowledge with an interactive quiz. Olaf Hollricher (WITec GmbH, Ulm, Germany) described the technical possibilities of Raman microscopes and explained how results can be improved with suitable instrument configurations.

Katarzyna Marzec (Jagiellonian University, Krakow, Poland) concluded the scientific presentations on the first day with a presentation of her work on correlative Raman microscopy in biomedical research. Marzec and colleagues use confocal Raman microscopy in combination with atomic force, near-field or fluorescence microscopy. They analyse biological tissues and cells to better understand and treat diseases such as arteriosclerosis, cancer and malaria.

The second day of the symposium started with a series of lectures on nanotechnology and low-dimensional materials. The lectures by Dirk Guldi (University of Erlangen, Germany) and Bo Peng (University of Electronic Science and Technology, Chengdu, China) dealt with research work that aims to improve the material properties of graphene, tungsten disulphide and molybdenum disulphide. These conductive nanomaterials are to be used in electronic devices in the future.

To begin the geoscientific lecture series, Guillaume Wille (BRGM Orleans, France) presented his investigations of polymorphic structures and asbestos using correlative Raman Imaging and Scanning Electron (RISE) microscopy. He combines the electron microscopy findings on sample morphology and nanostructure with the information on chemical mineral composition obtained by Raman microscopy. His investigations on asbestos allow health risks to be better identified and prevented.

Dominic Papineau (London Center for Nanotechnology, UK) delivered an overview of his comprehensive research results on geological samples. He is interested in the detection of organic compounds in rock in order to date the primeval occurrence of microbial life more precisely. Using Raman microscopy, Papineau and colleagues have recently been able to identify one of the oldest microfossils ever found.

Keith Gordon (University of Otago, Dunedin, New Zealand) detailed his chemical analyses of a wide range of different samples, including Maori archaeological fibers and hypomineralized teeth.

The materials science lecture series featured Martin Maiwald (Ferdinand-Braun-Institute, Berlin, Germany), who reported on SERDS, a method for removing interfering background and fluorescence signals from a Raman spectrum by means of two slightly different excitation wavelengths, which helps achieve better results.

Jagjit Nanda (Oak Ridge National Laboratory, USA) has been researching batteries for many years and was able to present extensive Raman analyses on the charge state of lithium-ion batteries.

Christian Timma (thyssenkrupp Steel Europe AG, Duisburg, Germany) vividly reported on the establishment of confocal Raman microscopy for quality control in steel production in his company.

In the life sciences lecture series, Isaac Pence (Imperial College London, UK) explained his research results on tissue-engineered cartilage. Pence and his colleagues hope to obtain an accurate picture of the chemical and molecular components of the tissue in order to come as close as possible to the properties of natural tissue. Pence also used Raman microscopy to analyze differences in the lipid composition of the myelin layer between normal nerve tissue and the tissue of mice with multiple sclerosis. He also presented the SPARTA method, which allows the analysis of small nanoparticles in solution by Raman spectroscopy without staining.

Dieter Baurecht (University of Vienna, Austria) talked about the broad spectrum of questions that are brought to his laboratory from different disciplines that he tries to solve by using confocal Raman microscopy and AFM.

This was followed by short presentations selected by a jury from the submitted summaries of the research work of the Symposium participants. Hesham K. Yosef (Ruhr University Bochum, Germany) gave a lecture on pharmacokinetic investigations of lung and breast cancer cells. He uses correlative Raman fluorescence microscopy to analyze the uptake and conversion of the cancer drug neratinib in cell cultures and was able to show that receptors that are important for cell growth are degraded by its introduction. Eva Brauchle (University of Tübingen, Germany) presented her work on Parkinson's disease. Using Raman imaging, she investigates altered protein structures and the formation of aggregates in the neuronal tissue of rats. In the future, her research might help to obtain information about the course of the disease at an early stage. Vinayam B. Parambath (HIU, Ulm, Germany) researches the charging and discharging mechanisms of metal-sulphur batteries in order to make them more efficient in the future.

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In the evening, the traditional conference dinner took place in the Ratskeller in Ulm. The Poster Award was also presented there. This year, the jury chose Dieter Fischer's (Leibniz Institute of Polymer Research, Dresden, Germany) poster on microplastic particle analysis.

As a summary of the symposium, the participants stated that both the content and the implementation of the Symposium were thoroughly impressive. Many have already announced their participation for next year.

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Words: 990

Characters with spaces: 6,814



Group picture of the Symposium participants 2018.

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The speakers of the Confocal Raman Imaging Symposium 2018: (from left to right): Olaf Hollricher, Bo Peng, Dieter Baurecht, Guillaume Wille, Dominic Papineau, Katarzyna Marzec, Martin Maiwald, Eva Brauchle, Vinayam B. Parambath, Isaac Pence, Hesham K. Yosef, Christian Timma. Not pictured: Sebastian Schluucker, Vince Ebert, Dirk Guldi, Keith Gordon, Jagjit Nanda.

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The winner of the Poster Award, Dieter Fischer (second from left) with jury members Katarzyna Marzec (second from right), Bo Peng (left) and WITec Managing Director Joachim Koenen (right).

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### **About WITec**

WITec is a leading German manufacturer of confocal and scanning-probe microscopes for state-of-the-art Raman, Atomic Force Microscopy (AFM), Scanning Near-Field Optical Microscopy (SNOM) and correlative Raman Imaging and Scanning Electron (RISE™) microscopy. All WITec products are developed and produced at the WITec headquarters in Ulm, Germany. Branch offices worldwide ensure an excellent sales and support network. WITec has been distinguished by its innovative product portfolio and a microscope design that enables combinations of the various imaging techniques within one system. Examples of the company's breakthrough development are the world's first integrated Raman-AFM and Raman-SEM microscopes. WITec's confocal microscopes are unrivaled in sensitivity, resolution and imaging capabilities. Significant innovation awards such as the Achema Innovation Award for the fully automated *apryon* microscope and a Prism Award for RISE™ microscopy document WITec's enduring success and innovative strength. For more information please visit [www.WITec.de](http://www.WITec.de).

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