Andreas Römpp and Sabine Guenther win the ABC Best Paper Award

Nicola Oberbeckmann-Winter • Andrea Pfeifer

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This year's Best Paper Award for outstanding work published in Analytical and Bioanalytical Chemistry (ABC) goes to Andreas Römpp (38) and Sabine Guenther (30) who are the lead authors of the paper "Mass spectrometry imaging with high resolution in mass and space (HR² MSI) for reliable investigation of drug compound distributions on the cellular level". Mass spectrometry (MS) imaging is the main research field of Drs Römpp and Guenther. To increase the validity and reliability of MS images, they focus on accurate mass-based identification of imaged compounds and on improving effective lateral resolution in biological tissue analysis. The authors were

Andreas Römpp studied environmental chemistry at the University of Bayreuth and at Colorado State University in Fort Collins, CO, USA. After his PhD at the Faculty of Chemistry and Pharmacy of the University of Mainz, Germany, in 2003 he worked as a postdoctoral researcher at the FOM Institute for Atomic and Molecular Physics (AMOLF), Amsterdam, The Netherlands, focusing on method development for bioanalytical applications. Dr Römpp is currently group leader at the Institute of Inorganic and Analytical Chemistry of Justus Liebig University Giessen, Germany. In recent years mass spectrometry imaging has become his main area of interest. Dr Römpp is co-chair of the interest group "MS imaging" of the German Society for Mass Spectrometry (DGMS) and coordinator of the common data format for mass spectrometry imaging—imzML. He is also actively involved in the EU COST network "Mass Spectrometry Imaging: New Tools for Healthcare Research" (BM1104).

Sabine Guenther received her diploma in chemistry from the Justus Liebig University of Giessen, Germany, in 2007. She received her PhD from the Faculty of Biology and Chemistry of Justus Liebig University Giessen, Germany, in the group of Professor Dr Bernhard Spengler in November 2011. Her doctoral thesis at the Institute of Inorganic and Analytical Chemistry focused on the development and application of atmospheric pressure ion sources for mass spectrometric investigation of biological tissue. The major part was improvement of MALDI MS imaging toward higher resolution in mass and space and improving the quality of data interpretation and substance identification.

able to combine the high-quality spectral features of Fourier-transform MS for the first time with lateral resolution in the low micrometer range for biological tissue imaging. The method was applied to phospholipids, neuropeptides, and drug compounds. The resulting MS images have excellent correlation with histological features and provide highly specific molecular information. Accompanied by EUR 1,000, the award is sponsored by Springer to honor the work of exceptional young scientists. The article "Mass spectrometry imaging with high resolution in mass and space (HR² MSI) for reliable

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investigation of drug compound distributions on the cellular level” by Andreas Römpp, Sabine Guenther, Zoltan Takats und Bernhard Spengler was published as Paper in Forefront in the ABC issue entitled “MALDI Imaging” (Vol. 401/1, pp. 65–73), now freely available online on SpringerLink at <http://www.springerlink.com/content/tr9755014x210736>.

Who are Andreas Römpp and Sabine Guenther?

Andreas Römpp and Sabine Guenther talk about their research, their motivations, and about themselves to Nicola Oberbeckmann-Winter and Andrea Pfeifer.

What was your motivation to do research in the area of mass spectrometry imaging?

A picture is worth a thousand words. If you can link a picture to valid chemical information, it becomes a very powerful analytical tool. Mass spectrometry imaging is used in many different fields including clinical, biological, and pharmaceutical applications, which makes this work very interdisciplinary and exciting.

Why do you think your work merits the ABC Best Paper Award?

We have significantly improved the quality of mass spectrometry images by increasing the spatial resolution while maintaining chemical specificity. This combination was not possible with previous methods.

How does the Award-winning work relate to your research and your present work?

Andreas: Mass spectrometry imaging is the focus of my habilitation which I plan to complete this year.

Sabine: Method development for MS imaging was the main part of my PhD thesis.

How would you explain your research to your child?

We cut a sample into very thin slices and shoot a laser at it. We can then paint a map of its main building blocks, e.g. sugars and lipids. This can help doctors to better understand and treat diseases.

What was the trickiest problem you had to overcome in that research? How did you solve it?

The biggest problem was obtaining sufficient ion signals from biological tissue. The solution was to carefully control and optimize every single step of the procedure including sample preparation, measurement conditions, and instrumental setup.

Where do you see your field heading and how do you see it affecting bioanalytical research?

Mass spectrometry imaging is a rapidly growing field with a very broad range of applications and instrumental setups. Standardized procedures, including sample-preparation protocols, data analysis routines, and reporting guidelines are needed if it is to become a robust and routine method. One activity in this respect is the common format for mass spectrometry imaging data—imzML (www.imzml.org)—that enables flexible data analysis.

Which incident/discovery has proved most valuable for your own research?

Pioneering work by Bernhard Spengler showed the feasibility of micrometer spatial resolution in MALDI imaging using a unique ion source setup. The invention of the Orbitrap mass spectrometer by Alexander Makarov significantly improved the sensitivity for high-mass-accuracy measurements. In our work we combined these two approaches.

Which incident/discovery most inspired you during your education and scientific career?

Seeing the first MS image from tissue after many failures and against all doubts was a great inspiration for both of us. It motivated us to go further and explore new applications until we finally obtained the first images of drug compounds.

Which recent discovery might prove most valuable to the field of (bio-)analytical research or beyond?

Ambient ionization techniques which can be used outside the laboratory environment are becoming increasingly popular. They enable rapid screening without time-consuming sample preparation. We are currently working on linking these techniques with MALDI imaging to obtain complementary information.

What was the best advice you ever received?

Andreas: “Don’t give up on your academic career.” by more than one good colleague/friend.

Sabine: “Alles wird gut.” (Everything is going to be fine) by Andreas.

Whom do you admire the most or who inspired you the most and why?

Our best ideas were inspired by friends and colleagues in the MS (imaging) community we meet at conferences and workshops. Discussing the details of matrix application while having an Islay whisky at 4 o’clock in the morning or arguing about the usefulness of normalizing mass spectra while hiking in the Rocky Mountains can be very stimulating.

What are your future plans?

Andreas: Finding a professorial position that enables me to continue my research in mass spectrometry imaging.

Sabine: I am currently looking for a post-doc position abroad where I can apply MSI techniques in preclinical studies.

What do you do in your spare time?

You mean besides setting up imaging experiments during the weekend?

Andreas: There is no spare time (anymore). I have a seven month old son who keeps me busy—and happy.

Sabine: The rest of my spare time I spend with family and friends, and horseback riding.