Agilent Case Study: Oliver J. Schmitz, PhD

The Pleasures of Analytical Chemistry

Agilent-sponsored lab brings together outstanding researchers and leading technologies

Oliver Schmitz would like to introduce all comers to the pleasures of analytical chemistry.

"There is no other subject that is as interdisciplinary as analytical chemistry," he says. "You have to deal with so many different issues—biology, environment, plants, water, medicine—and can learn so much."

Schmitz teaches analytical chemistry at the University of Duisburg-Essen and manages the new Agilent-sponsored Teaching and Research Center there. The state-of-the-art center showcases Agilent's **gas** and **liquid chromatography** systems as well as a variety of its **mass spectrometry instruments**.

The center will support an extensive cross-section of research activities in biomedicine, nanotechnology, and other life science specialties—bringing together Agilent's leading analytical technologies with the university's outstanding researchers.

The projects Schmitz is most excited about at the moment range from investigations into what makes traditional folk medicine effective to how life began on earth.

Traditional folk medicine

"Last year in Vietnam, in cooperation with a local group, we started a search for drugs against liver disease with the survey of 69 practitioners and patients cohorts in the northwestern regions of the country, which includes 30 ethnic groups of 9 million people," Schmitz says.

"We collected 147 plant recipes used to treat liver disease, of which 118 have a success rate of over 50 percent. The five most promising recipes have been selected for chemical, pharmacological, and clinical trials. We will try to identify the most important compounds in these recipes with our multidimensional analytical platforms and with *in vitro* and *in vivo* tests."

Oliver J. Schmitz, PhD

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The origin of life

“Based on a new model of how life may have originated, we have established an efficient and stable system of structural reproduction, self-optimization, and molecular evolution. This system is formed by the interaction of two cyclic processes: one offering vesicles as the structural environment, the other supplying peptides from a variety of amino acids as versatile building blocks,” Schmitz explains.

“Meanwhile, we can show that structures growing in a combination of both cycles have the potential to support their own existence, to undergo chemical and structural evolution, and to develop unpredicted functional properties. The development of the proposed system over time not only would represent one of the principles of life, but could also be a model for the formation of self-evolving structures ultimately leading to the first living cell.”

Using liquid chromatography in combination with high-resolution mass spectroscopy, Schmitz and his colleagues have found clear evidence of a vesicle-induced accumulation of membrane-interacting peptides. Their experiments show that the selected peptide has an immediate effect on the vesicles, leading to reduced vesicle size, increased vesicle membrane permeability, and improved vesicle stability.

The demands of analytical chemistry

Schmitz notes that the center will be teaching students about separation science and training them in the use of modern analytical equipment.

"The demands on modern analytical chemistry are steadily growing and require a more profound knowledge in separation and detection techniques,” he says. “They are highly relevant for industrial practice—for example, in product control—so there is a desire for more appropriately trained technical staff. So, the most important aim for me is to get the students fit for the job market and to make sure that they find a good job very quickly.”

Schmitz points out that analytical chemistry—and the hands-on experience students gain at the center—will enable them to “live out their creativity” by building new devices or combining different devices. (He has set an example by cofounding iGenTraX, a small company that develops new ion sources and units to couple separation techniques with mass spectrometers.)

He credits Agilent with being very supportive in helping to found the Teaching and Research Center and for providing teachers with informative material about the company’s latest device developments.

The fifth dimension

“At the moment, our biggest challenge is data analysis,” he says. “Due to the increasingly complex issues and the huge amounts of data generated, for example, by the **Agilent ion mobility quadrupole time-of-flight mass spectrometry** system, there are sometimes problems in being able to understand it all.”

Nevertheless, Schmitz is excited about the prospect of gathering ever-more-detailed data.

“I am looking forward to the further development of our five-dimensional analysis platform,” he says, “consisting of **2D-LC**, fragmentation, ion mobility, and mass spectrometric detection.”

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Published in the USA, August 16, 2018
5994-0006EN

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