

Interview

The perfect sensor?

Boris Mizaikoff talks to Amaya Camara Campos about sensors, industrial collaborations and taking research home



Boris Mizaikoff

Boris Mizaikoff is head of the Institute of Analytical and Bioanalytical Chemistry at the University of Ulm, Germany. His research interests focus on optical sensors, biosensors and biomimetic sensors operating in the mid-infrared spectral range, applications of novel IR light sources, environmental analytical chemistry, process analytical chemistry and biomedical diagnostics. He is the associate editor for Europe for *Analyst*.

Who or what inspired you to become a chemist?

Actually for a long time I wanted to become a biologist! I was intrigued by the complexity of how life works, how cells work. But then I realised that every biological process, regardless of how complex it is, can be broken down into a sequence of chemical processes and chemical reactions at the molecular level. The deeper understanding comes from understanding the chemistry first and that's why I decided to go into chemistry.

What makes a 'perfect' sensor?

That is a difficult question to answer. If I could dream up a perfect sensor it would be a device that provides information in situ, ideally quantitative and qualitatively. It would work continuously so you don't have to take samples and on top of that it should provide molecular discrimination so you can probe multiple species at the same time. However, real sensors are always a compromise between these properties – that's why there is still a lot of research to do to get closer to the 'perfect' sensor!

Is collaboration with industry very important for your research field?

It is almost a vital component. Frequently, analytical problems arise in an industrial environment. We very actively collaborate with industry, but we try not to restrict ourselves by these collaborations in terms of the fundamental research we are doing and the scientific creativity we put into that process. But we certainly like to orient the applied aspects of our research towards some real world questions.

As science becomes increasingly interdisciplinary, how do you see the future of science, and chemistry in particular?

I think chemistry has always been an interdisciplinary field, but it is particularly true for modern analytical chemistry. For example, the development of optical sensors requires venturing into physics, optics, and electronics next to chemistry. But I think it is important to acknowledge that first you must be an expert in your specific field. The interdisciplinary aspects complement, but cannot replace that. Doing interdisciplinary research means remaining keen on learning new things, not being afraid to start from scratch and teaming up with the best experts in the field, because you also have to realise that only very few scientists master several disciplines at the highest possible level!

What projects are you working on at the moment?

I am in the very fortunate situation that I am scientifically collaborating with my wife, Christine Kranz, who is an expert in electrochemistry and surface analysis. Together we are trying to combine different analytical techniques to work time and spaced synchronised in the same sample. That is particularly interesting for biological systems and bioanalysis. Cells, cellular samples, tissues, tissue patches and so on, are fairly complex biological entities and a single analytical technique will not provide you with all the information on what is happening.

You have worked in Europe and the US, does research differ at both sides of the Atlantic?

Yes and no. Of course there are differences in social structures, culture, infrastructure, funding opportunities – otherwise it wouldn't be so attractive to spend part of your life in a different environment. But what really matters is the people doing the science, putting in the ideas, their creativity, developing new approaches, they are the ones who discover something new. In that sense it truly doesn't matter whether you do your research in the US, in Asia, or as I do it right now in Germany. Of course, more resources make your life easier sometimes, but it does not necessarily improve the quality of your research!

What will be the next hot topic in analytical chemistry?

It is always tough to predict the hot areas because you could call me at the end of next year and tell me I was completely wrong! The areas of energy, life sciences, nanotechnology and nanomaterials are certainly driving forces in analytical chemistry. Also, bringing quantitative analytics closer to the medical and clinical environment with a direct impact on human health is an area of great importance and our current research activities fall along these lines.

What keeps inspiring you to do your job everyday?

It is the interaction with people, in particular with the students. Trying to create something together with other people is probably the most rewarding experience as a scientist. Also the collaboration with my wife is very inspiring, we both bring different scientific backgrounds and abilities to the table, venturing into fields we probably would not pursue as individuals. Of course, if we bring them also to the dinner table, our kids have the right to veto our conversations!