O. S. Wolfbeis

O. S. Wolfbeis has recently published his ***10th article*** *since 2000 in Angewandte Chemie:*
"Photographing Oxygen Distribution": X. Wang, R. J. Meier, M. Link, O. S. Wolfbeis, *Angew. Chem.* **2010**, *122*, 5027–5029; *Angew. Chem. Int. Ed.* **2010**, *49*, 4907–4909.

Otto S. Wolfbeis

Date of birth: July 18, 1947
Position: Professor of Analytical and Interface Chemistry at the University of Regensburg (Germany)
Education: 1972 PhD with Prof. H. Junek, Karl-Franzens University, Graz (Austria)
1973–1975 Postdoctoral fellow with Prof. E. A. Koerner von Gustorf at the Max Planck Institute for Radiation Chemistry, Mülheim (Germany)
1978–1979 Postdoctoral fellow with Prof. E. Lippert at the Technical University Berlin (Germany)
Awards: **1987** Feigl Prize for Microanalysis; **1989** Merck Prize for Achievements in Sensor Technology; **2003** Japanese Honorary Lectureship Award; **2010** Křižík Medal (Czech Acad. Sci.)
Current research interests: Optical chemical sensors and biosensors, fluorescent probes, labels, and nanobeads; chemical imaging; fiber optic sensors; intracellular sensing; fluorescence upconversion; novel spectroscopic schemes; new methods of interface chemistry (such as click reactions); analytical applications of advanced materials (such as upconverting luminescent nanoparticles and graphenes)
Hobbies: reading books on topics other than chemistry, playing the piano, gardening

My favorite subject at school was … music.

When I was eighteen I wanted to be … much wiser.

In ten years time I will be … retired and—hopefully—will better understand present day society after having read a couple of books related to human and papal history.

The most significant scientific advances of the last 100 years have been … our understanding of the molecular basis of genetics and the discovery of the Haber–Bosch process that now feeds the world.

The biggest problem that scientists face is … how to prevent the fact that science (along with medicine and technology) is causing the population of the world to grow further.

The biggest challenge facing scientists is … to understand the function of the brain.

My greatest achievement has been … the design of optical chemical sensors that are now being used in about 70 % of all critical care operations worldwide.

I am waiting for the day when someone will discover … a pill against dullness, vanity, and religious fanaticism present all over the world.

The worst advice I have ever been given was … not to study chemistry because theoretical chemistry rather soon will be in a situation to predict all the properties of any conceivable molecule.

The three qualities that make a good scientist are … creativity, passion, and hard work.

If I were not a scientist, I would … try to be a politician.

Chemistry is fun because … one almost never knows whether a new experiment will work or not (even if most thoughtfully designed).

The part of my job which I enjoy the most is … brainstorming with co-workers and colleagues.

My first experiment was … to throw a (too big) piece of sodium metal into a pot of water in my mother's kitchen while she was (briefly) absent.

My biggest inspiration is … a certain journal.

How is chemistry research different now than it was at the beginning of your career?

Research is much more efficient and interdisciplinary. It is also more and more governed by quantitative data in order to "prove" success (whatever that may be) and by topics considered to be "hot".

Has your approach to chemistry research changed since the start of your career?

Yes and no. From the very beginning of my research until now I have liked to work on challenges that are of interest per se, but that also have a wider perspective. This is a typical feature of fundamental research. Interestingly, many results turned out to be quite practical, while others have contributed to our general knowledge. Unlike 30 years ago, I now see chemistry as a whole rather than dividing it into its subgroups, which was the case at the beginning of my career when I was focusing on organic chemistry.

Has your approach to publishing your results changed since the start of your career?

Yes. My co-workers, in particular those from abroad, are urging me to publish results in high-ranking journals. My own attitude has changed (probably like that of most others) towards writing articles in a much more concise style.

What do you think the future holds for your field of research?

I believe that (bio)analytical chemistry (including sensing) is a very-fast-growing and fascinating area of research that has little to do with the analytical chemistry (typical of 1930) presently taught at many German universities. Its success results from its highly interdisciplinary nature. Often not readily accepted in chemical faculties, it will move towards other areas of research. Classical and inorganic analytical chemistry will continue to lose ground.

Have you changed the main focus of your research throughout your career and if so why?

My first focus was on organic chemistry until I discovered that analytical chemistry is more challenging and is an area in which I could even better apply my knowledge of organic, inorganic, materials and physical chemistry, and biochemistry.

What has been you biggest influence/motivation?

Curiosity.

What advice would you give to up-and-coming scientists?

First, go to a good school, look for a good supervisor, learn as much as you can, then go your own way and make your own decisions. Take some risks.

What is the secret to publishing so many high-quality papers?

Do good research, do not copy other people's work, put results in short wording, convey a clear message, and—when writing the article—put yourself in the situation of a prospective reader.

My 5 top papers:

1. "Photographing Oxygen Distribution": X. Wang, R. J. Meier, M. Link, O. S. Wolfbeis, *Angew. Chem.* **2010**, *122*, 5027–5029; *Angew. Chem. Int. Ed.* **2010**, *49*, 4907–4909.
   The first method to visualize molecular oxygen is presented. The method is based on a smart sensor film (containing two fluorescent dyes) and the RGB option of conventional digital cameras. Applications range from photographing skin tumors to photographing the air pressure on the surface of aircrafts.
2. "Surface-Modified Upconverting Microparticles and Nanoparticles for Use in Click Chemistries": H. S. Mader, M. Link, D. E. Achatz, K. Uhlmann, X. Li, O. S. Wolfbeis; *Chem. Eur. J.* **2010**, *16*, 5416–5424.
   The particles are capable of converting near-infrared (NIR) light into visible luminescence (red and green) and can be functionalized so that they can be conjugated to proteins. If surface-modified with organic fluorophores, they emit various colors (such as green, red, and yellow), depending on whether they are photoexcited with NIR light or visible light, and thus are well-suited for optical encoding.
3. "A Nanogel for Ratiometric Fluorescent Sensing of Intracellular pH Values": H. Peng, J. A. Stolwijk, L. Sun, J. Wegener, O. S. Wolfbeis; *Angew. Chem.* **2010**, *122, 4342–4345; Angew. Chem. Int. Ed.* **2010**, 49, 4246–4249; *Angew. Chem.* **2010**, *122*, 4342–4345; *Angew. Chem. Int. Ed.* **2010**, *49*, 4246–4249.
   The particles reported are made from a hydrogel, are highly biocompatible, and enable cellular pH to be monitored (by a smart FRET mechanism) with very good spatial resolution and without any interference by proteins that often affect the performance of dissolved molecular probes.
4. "Chameleon Labels for Staining and Quantifying Proteins": B. K. Wetzl, S. M. Yarmoluk, D. B. Craig, O. S. Wolfbeis, *Angew. Chem.* **2004**, *116*, 5515–5517; *Angew. Chem. Int. Ed.* **2004**, *43*, 5400–5402.
   A truly beautiful class of labels for proteins and amines. Unlike other labels, their (blue) color changes (to red) on conjugation to amines. This is quite a useful effect when labeling complex mixtures and in proteomics because the detector sees the labeled protein only, but not the excess label.
5. "Fiber-Optic Microsensors for Simultaneous Sensing of Oxygen and pH, and of Oxygen and Temperature": A. S. Kocincova, S. M. Borisov, C. Krause, O. S. Wolfbeis, *Anal. Chem.* **2007**, *79*, 8486–8493.
   Oxygen, pH, and temperature are the most-often determined parameters in biotechnology and in the chemical industry. This fiber optic approach (based on µm-sized optical fibers) enables all three to be determined simultaneously and in real time.

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