

Profile

Current Research Interest

My educational and professional background lies in the area of optical sensor development, combining mathematics and analytical chemistry. My field of experience includes the development of stand-alone sensors, their calibration and optimization for various applications in marine science. The development of smart evaluation strategies, including multivariate data analysis, is a crucial part to involve. Besides this, another subject is the modelling of chemical systems with the purpose to enhance our understanding of environmental systems. Moreover, I have experience in organization of scientific events and project management.

Future Research Interest

I enjoy working at the crossroads between different disciplines, including mathematics, chemistry and marine scientists. Hence, for future research, I would like to contribute with my knowledge of optical sensor development, multiplexed sensors and data processing, while also developing my abilities further, and learning new techniques and applications relevant to environmental monitoring. I thrive in a productive atmosphere with plenty of discussion and brainstorming, and enjoy organizing events, working together with students and building collaboration.

Employment

- 03/2023-Present Postdoc at the Department of Department of Mechanical and Production Engineering
- 01/23-Present Postdoc at the Department of Biology - Aarhus University Center for Water Technology (WATEC) | Project WaterKnowledge
- 11/19-10/22 Postdoc at the Department of Biology - Aarhus University Centre for Water Technology (WATEC) | Project AmmoniSens
- 09/19-11/19 Postdoc at the Institute of Analytical Chemistry and Food Chemistry at Graz University of Technology
- 08/17-12/19 Technical editor at *Microchimica Acta* responsible to the formal reviewing process. As one of several freelancers under the coordination of Prof. O. Wolfbeis, I review submitted manuscripts according to given guidelines
- 10/13 – 10/17 EU FP7-Project SCHeMA – Integrated in Situ Chemical Mapping Probe as part of this EU-funded project, I was involved in the development of an optical sensor for the early stage identification of toxin producing algal groups. This project included project meetings around Europe with international partners (both university and industry), several presentations and reports as well as the organization of meetings and a summer school. Besides, the organization and participation in three transnational research trips were part of the project
- 10/16 – 11/16 Internship at the Institute for Phytoplankton Ecology at the University of the Basque Country (UPV/EHU), Leioa (Spain) supervised by Prof. Sergio Seoane and Aitor Laza. This month-long stay was used to characterize various algae species of their algal cultivation collection. It provided insights in phytoplankton cultivation and the PAM fluorometry
- 08/14 – 09/14 Traineeship at Helmholtz Zentrum München in Munich (Germany); Deepening experiences in capillary electrophoresis (CE) and inductively coupled plasma mass spectroscopy (ICP-MS) for biological samples
- 03/12 - 11/14 Research fellowship at the Institute of Process and Particle Engineering at Graz University of Technology; Project: The green heart of Styria focusing on the optimization of the process network composition of the Styria model regions for climate and energy under the leadership of Professor M. Narodoslawsky
- 07/12 – 08/12 Traineeship at Analytik Jena AG – Analytical Instrumentation in Jena (Germany); Deepening experiences for instrumental analytics especially for the elementary analysis, TOC and AOX. Handling of several analytical instruments, especially the multi EA4000®

Education

- 03/16-08/19 PhD candidate in Natural Science (Technical Chemistry) at Graz University of Technology. Topic "Multiparametric Sensing – from Development to Application in Marine Science". Supervision Professor Ingo Klimant. Grade "with greatest distinction"
- 10/13-12/15 Master program in Chemistry at Graz University of Technology
- 10/10-09/13 Bachelor program in Environmental System Sciences at the University of Graz and Graz University of Technology (NAWI-project)

Publikationer

Cable Bacteria Skeletons as Catalytically Active Electrodes

Digel, L., Mierzwa, M., Bonné, R., Zieger, S. E., Pavel, I. A., Ferapontova, E., Koren, K., Boesen, T., Harnisch, F., Marshall, I. P. G., Nielsen, L. P. & Kuhn, A., 5 feb. 2024, I: *Angewandte Chemie - International Edition*. 63, 6, e202312647.

Timing matters: the overlooked issue of response time mismatch in pH-dependent analyte sensing using multiple sensors

Steininger, F., Zieger, S. E. & Koren, K., dec. 2023, I: *Analyst*. 148, 23, s. 5957-5962 6 s.

Optical sensors (optodes) for multiparameter chemical imaging: classification, challenges, and prospects

Kalinichev, A. V., Zieger, S. E. & Koren, K., nov. 2023, I: *Analyst*. 149, 1, s. 29-45 17 s.

Optical chemical sensors for soil analysis: possibilities and challenges of visualising NH₃ concentrations as well as pH and O₂ microscale heterogeneity

Merl, T., Hu, Y., Pedersen, J., Zieger, S. E., Bornø, M. L., Tariq, A., Sommer, S. G. & Koren, K., 17 jul. 2023, I: *Environmental Science: Advances*. 2, 9, s. 1210-1219 10 s.

Machine learning for optical chemical multi-analyte imaging | Why we should dare and why it's not without risks

Zieger, S. E. & Koren, K., jun. 2023, I: *Analytical and Bioanalytical Chemistry*. 415, 14, s. 2749-2761

Noise versus Resolution in Optical Chemical Imaging—How Reliable Are Our Measurements?

Zieger, S. E., Jones, P. D. & Koren, K., apr. 2022, I: *ACS Omega*. 7, 14, s. 11829–11838 10 s.

Optode Based Chemical Imaging—Possibilities, Challenges, and New Avenues in Multidimensional Optical Sensing

Koren, K. & Zieger, S. E., maj 2021, I: *ACS Sensors*. 6, 5, s. 1671-1680 10 s.

Viability determination of *Bacillus sphaericus* after encapsulation in hydrogel for self-healing concrete via microcalorimetry and in situ oxygen concentration measurements

Zhu, X., Mignon, A., Nielsen, S. D., Zieger, S. E., Koren, K., Boon, N. & De Belie, N., maj 2021, I: *Cement and Concrete Composites*. 119, 104006.

Dynamic Sensor Concept Combining Electrochemical pH Manipulation and Optical Sensing of Buffer Capacity

Steininger, F., Zieger, S. E. & Koren, K., feb. 2021, I: *Analytical Chemistry*. 93, 8, s. 3822-3829 8 s.

Hyperspectral Luminescence Imaging in Combination with Signal Deconvolution Enables Reliable Multi-Indicator-Based Chemical Sensing

Zieger, S. E., Moßhammer, M., Kühl, M. & Koren, K., jan. 2021, I: *ACS Sensors*. 6, 1, s. 183–191 9 s.

TADF-Emitting Zn(II)-Benzoporphyrin: an indicator for simultaneous sensing of oxygen and temperature

Zieger, S., Steinegger, A., Klimant, I. & Borisov, S. M., apr. 2020, I: *ACS Sensors*. 5, 4, s. 1020-1027 8 s.

Multiparametric Sensing - from Development to Application in Marine Science

Zieger, S. R. E., maj 2019, 247 s.

Spectral Characterization of Eight Marine Phytoplankton Phyla and Assessing a Pigment-Based Taxonomic Discriminant Analysis for the in Situ Classification of Phytoplankton Blooms

Zieger, S. E., Seoane, S., Laza-Martínez, A., Knaus, A., Mistlberger, G. & Klimant, I., 18 dec. 2018, I: *Environmental Science and Technology*. 52, 24, s. 14266-14274 9 s.

Compact and Low-Cost Fluorescence Based Flow-Through Analyzer for Early-Stage Classification of Potentially Toxic Algae and in Situ Semiquantification

Zieger, S. E., Mistlberger, G., Troi, L., Lang, A., Confalonieri, F. & Klimant, I., 3 jul. 2018, I: *Environmental Science and Technology*. 52, 13, s. 7399-7408 10 s.

Fast pesticide detection inside microfluidic device with integrated optical pH, oxygen sensors and algal fluorescence

Tahirbegi, I. B., Ehgartner, J., Sulzer, P., Zieger, S., Kasjanow, A., Paradiso, M., Strobl, M., Bouwes, D. & Mayr, T., 15 feb. 2017, I: *Biosensors and Bioelectronics*. 88, s. 188-195 8 s.

SCHeMA EU project summer school report

Akter, M., Auguste, M., Bir, J., Blanco, E., Briaudeau, T., Dapuelto, G., Cerio, D. D., Coccoli, C., Creemers, M., Espino, M., Gain, D., Gil-Uriarte, E., Grimaldi, C., Khalil, S. M. I., Lopez, A., Rementeria, A., Roch, M., Rodriguez, A., Roman, O. & Ruoyu, H. & 13 flere, Abdou, M., Crespi, M. C., Botia, M. C., Figuera, M., Gil-Diaz, T. B., Kowal, J. L., Luxenburger, F., Mirasole, C., Pankratova, N., Penezic, A., Zieger, S., Tercier-Waeber, M. L. & Nardin, C., 1 jan. 2017, I: *Chimia*. 71, 9, s.

607-610 4 s.

Projekter

AmmoniSens Optical Ammonia Sensors for Water Monitoring

Zieger, S. E. (PI) & Koren, K. (PI)

01/10/2019 → 30/09/2023

LCA of emerging technologies of CO2-related technologies

Zieger, S. E. (Samarbejdspartner)

15/03/2023 → 14/10/2023

WaterKnowledge - Knowledge-driven Digitalisation of Water Environments

Koren, K. (PI), Lucani Rötter, D. E. (PI), Zieger, S. E. (Deltager) & Heick, R. (Deltager)

01/01/2023 → 31/12/2024