1/2022

BBPCAX 101 (8) 1083-1196 (1998)
ISSN 1611 – 9479

Bunsen-Magazin

Zeitschrift der Deutschen Bunsen-Gesellschaft für physikalische Chemie

Haben wir bereits Ihre E-Mail-Adresse?

Wir möchten klimafreundlich arbeiten und Sie gerne auf dem neuesten Stand halten und Ihnen aktuelle Informationen und Neuigkeiten zur **physikalischen Chemie und aus der DBG** liefern.

Dafür brauchen wir Ihre E-Mail-Adresse!

Und so funktioniert's:

Schreiben Sie uns eine Mail an geschaeftsstelle@bunsen.de oder gehen Sie auf www.bunsen.de unter *Login* und geben Sie Ihre Mitgliedsnummer und Passwort an. Unter *Meine Mitgliedsdaten* tragen Sie Ihre E-Mail-Adresse ein.

Kennen Sie den DBG-Stellenmarkt?

Nutzen Sie für Ihre Stellenausschreibung bunsen.de oder das Bunsen-Magazin

Ihre Vorteile sind:
- Gezielte Ansprache von Fachkräften aus der Physikalischen Chemie
- Kostenfreier Online-Stellenmarkt für Promotionen, Postdocs und Nachwuchsgruppenleitungen

Preise und Formate finden Sie auf www.bunsen.de/stellenmarkt

Sprechen Sie uns gerne an – Sie erreichen uns unter geschaeftsstelle@bunsen.de oder 069 7917-363

IMPRESSUM

Bunsen-Magazin

Heft 1 Jahrgang 24

Herausgeber:
Vorstand der Deutschen
Bunsen-Gesellschaft
Florian Budde
Jürgen Janek
Ulrich Ott

Schriftleitung:
Katharina Al-Shamery
Institute of Chemistry,
School of Mathematics and Natural Sciences
Carl von Ossietzky University Oldenburg
P.O. Box 2503
D-26111 Oldenburg, Germany
Phone (fax): +49-441-798-3853 (-3089)
Email: katharina.al.shamery@uol.de

Geschäftsführerin der Deutschen
Bunsen-Gesellschaft
Elisabeth Kapatsina
Varrentrappstr. 40-42
D-60486 Frankfurt
Tel.: 069 / 79 17 363
Fax: 069 / 79 17 1363
E-Mail: geschaeftsstelle@bunsen.de

Technische Herstellung:
die printzen GmbH
Gewerbepark 21
D-92289 Ursensollen
Tel.: +49 9628 / 924 89-0
Fax: +49 9628 / 924 89-10
E-Mail: info@dieprintzen.de

Das Bunsen-Magazin
wurde auf recyceltem
Papier gedruckt.

Zum Titelbild:
upper row (from left to right):
Dr. hc Hauwa Ibrahim, Willis Muganda, Waithera Wambugu, Bwari Ondima, Dr. Nassifatou Tittikpina

lower row (from left to right):
Prof. Dr. Megan Becker, Dr. Elaine Opitz, Dr. Rhiyaad Mohamed, Prof. Dr. Nico Fischer, Prof. Dr. Jack Fletcher

Joybrato Mukherjee

The Importance of a Global Community of Responsibility and the Role of Science Diplomacy

Foto: Jonas Ratermann

During the 2021 federal election campaign that has just ended, it was emphasized that the coming legislative period is likely to be the last opportunity to make a substantial contribution to achieving the 1.5-degree target of the Paris Agreement through political decisions. At the same time, it is clear that the fight against man-made climate change cannot be waged at the national level alone; Germany is "only" responsible for just under two percent of all CO_2 emissions worldwide. Considering the magnitude of the challenge, a coordinated European and global climate policy is therefore urgently needed. Promising solutions for a climate-neutral world can only be developed in a global community of responsibility.

Even beyond the challenges of climate policy, we have fully arrived in the age of the Anthropocene. Humans and their behaviour have become the most important factor influencing not only atmospheric processes, but also biological and geological processes on Earth. The reduction of biodiversity and the degradation of soils caused by intensive agriculture, the enormous pollution caused by plastic waste, the destruction of habitats for many millennia caused by nuclear tests and nuclear disasters - these are just a few examples of the importance of the human factor for the development of our planet. Here, too, the following applies: A noticeable reduction of the disastrous effects of human behaviour and economic activity will only be achieved through the cooperation of as many states as possible, assuming responsibility as a global community.

COVID-19 has also shown that global challenges in the Anthropocene can only be addressed on the basis of scientific knowledge. Pandemic control has been most successful where the relevant measures could be scientifically justified. Vaccine development has been able to succeed at an unprecedented rate in global alliances of science and industry - massively supported by politics. At the same time, we know that there are already large differences in vaccine availability between continents. However, in our mobile and interconnected world, a pandemic can only be overcome if all citizens of the countries of this world gain equal access to vaccines. This, too, is the task and obligation of a global community of responsibility.

The task and aspiration of German foreign policy under a new federal government must therefore be to shape the global community of responsibility through planetary thinking and cooperation. The field of action of *Außenwissenschaftspolitik* - the domain of scientific exchange and international cooperation in research and teaching - plays a prominent role in this context.

As early as 1975, the Federal Republic of Germany defined foreign cultural policy, *Auswärtige Kulturpolitik*, as one of three pillars of its foreign policy and later developed it further into the concept of *Auswärtige Kultur- und Bildungspolitik, AKBP*. In this context, aspects of scientific cooperation have increasingly gained strategic importance for Germany's foreign policy. Due to the global challenges of our time, the international networking of German universities and research institutions plays a constitutive role in German foreign policy as part of its foreign science diplomacy. Today, with its extensive activities in the promotion and exchange of students, scientists and scholars, in fostering scientific cooperation between German and foreign institutions, and in development cooperation with the Global South, Germany has an excellent reputation as an honest broker, as a reliable partner, and as a valued member of a global community of responsibility.

In view of the existential challenges facing humanity and the increase in the world's population to around ten billion people by the year 2100, it is imperative to maintain and expand close and cooperative relations with as many countries in the world as possible. Intercultural encounters, scientific exchange and joint collaboration in transnational educational projects can make a significant contribution to this. German foreign science policy must therefore not unnecessarily define "red lines" vis-à-vis other states. German Higher Education institutions and their members must be prepared to cooperate with countries with other legal systems and values, as far as this is justifiable and responsible. In doing so, it is important to represent our own interests and stand up for our values, even in the face of challenging partners. Such processes of exchange and negotiation can be difficult, but they are imperative, because in the world of the Anthropocene, solutions to global challenges can only be worked out if states do not close themselves off from one another.

"Change through exchange" - the motto of the DAAD sums it up: If we want to successfully shape the necessary change in human behaviour and economies globally, this will only be possible in the constant intercultural and international exchange of people worldwide. Organizing this exchange in the field of science for the benefit of our common development on earth is the primary task of foreign science policy in the 2020s.

Prof. Dr. Joybrato Mukherjee
Deutscher Akademischer Austauschdienst e.V. (DAAD)
Kennedyallee 50, D-53175 Bonn
cremer@daad.de

Cay Etzold

Chemists across Borders: The Role of the German Academic Exchange Service (DAAD) Connecting African and German Academia

One of the many networks of excellence DAAD funded in Africa is NAPRECA, the Natural Products Research Network for Eastern and Central Africa. [1] The network was established in 1984 and supported through UNESCO. Meanwhile the Network has national chapters in its member states. Its focus is on the chemistry of natural products. The DAAD supported NAPRECA for two decades. In recent years the annual symposium of this network consisting of DAAD alumni and other African top chemistry scholars became one of the major events of up-to-date scientific exchange on latest research developments in Africa. The 19th NAPRECA symposium "Natural Products towards global Challenges and sustainable development in Africa" took place in November 2021 in Rwanda.

DAAD's support of NAPRECA was realised in the frame of the In-Country/In-Region scholarship scheme which supports the training of future professionals, managerial staff and university teachers. In order to strengthen research capacities on the African continent the programme offers African scholarship holders the opportunity to pursue postgraduate or doctoral studies at universities in their home country or at highly qualified institutions in neighbouring countries. Every third year a regional call is made for African institutions to apply for grants-funding. The In-Country/In-Region scholarship scheme has been the signature programme of DAAD for more than five decades making DAAD one of the biggest supporters of inner-African academic mobility and a key supporter of centres and networks of excellence. These days the graduates of those centres and networks are partners not only to the World Bank but also to many top-level German and international universities.

This happens against the backdrop of DAAD's decade-long sustained engagement in Africa. Greatly expanding in the 70ies and 80ies of the previous century and again from 2015 DAAD's work with African partners has been focusing on education and training of qualified staff and managers, establishing, and modernising university systems, connecting partner countries to the global knowledge society, providing support to transformation processes, and boosting the graduates' employability.

Today, DAAD is working along the following five key lines:

(1) Support students to become university lecturers in Africa through scholarships to study in German institutions of higher education and top-performing universities in neighbouring African countries
(2) Support African universities in expanding their graduate training and research capacities
(3) Strengthen universities in the region as effective drivers of social development – e.g. by funding applied research and degree programmes relevant to the labour market
(4) Enable German universities to gain easier access to the African continent and present information about Germany in Africa
(5) Strengthen synergistic and collaborative projects, creating a close alliance between German and African partners, especially with regional university organisations in Africa

After an extended period of individual scholarships and continued funding by DAAD and other international partners of the higher education systems, graduate schools and centres of excellence have been developed through partnerships. Like NAPRECA various other national and continent wide disciplinary academic networks have been created, among others driven by the expertise and capacities of DAAD alumni.

Furthermore, over the years, the DAAD has implemented, in cooperation with African Governments, co-financed scholarship programmes for young academics to obtain their PhD at German Universities. Demand for such joint initiatives in Africa is constantly increasing. At present, active co-operations exist with Kenya, Ghana, Nigeria, Ethiopia, and Rwanda. Last year in total 253 Master- and PhD-students were sponsored with funds from African governments and institutions, among them students from Ghana and Nigeria working on topics of chemistry and chemical engineering for their PhD. In addition, the DAAD supported 179 scholars for their PhD within its regular grants scheme. Last year, the DAAD sponsored a total of 432 early-career researchers and/or university staff. These measures form the basis for promising new research projects and co-operation developments.

Cay Etzold
Senior Expert
Knowledge Exchange and Network
Center for International Academic Collaborations - S21
Sub-Saharan Africa, Eastern Europe, South Caucasus, Central Asia
German Academic Exchange Service
Kennedyallee 50 | 53175 Bonn
Tel.: +49 228 882-4565
etzold@daad.de
www.daad.de | www.daad.de/kompetenzzentrum
www.daad.de/regionalinformationen

DOI-Nr.: 10.26125/2arq-1r48

Besides individual scholarships DAAD is supporting university co-operations like the "University-Business-Partnerships" programme. In the context of the "Special Initiative Formation/Training and Employment", the program contributes to the stronger practical orientation of higher education in Ethiopia, Ivory Coast, Ghana and Senegal and in subject areas like textile industry, food processing industry, renewable energies and energy efficiency, biotechnology and agricultural sciences, among others.

Finally, DAAD supports African universities wishing to expand their graduate training and research capacities. Programmes such as 12 "Centres of African Excellence" and 3 "Bilateral SDG Graduate Schools" are prominent examples. At present, the DAAD is supporting university centres of international standing at 18 different African locations across the continent. Through joint research and teaching, they are destined to solve global challenges for mankind in an interdisciplinary manner.

One of the above-mentioned bilateral SDG Graduate School has a focus on chemistry as well. The YaBiNaPa – "Yaoundé – Bielefeld Graduate School Natural Products with Antiparasite and Antibacterial Activity" is a joint project of both universities. "YaBiNaPA has the mission to overcome this problem by educating PhD students in an interdisciplinary and transnational way and also to create a scientific communication platform between biologists, chemists, pharmacologists, the public, and traditional healers." [2] The joint project works with universities of six African countries, namely Benin, Cameroon, Ethiopia, Madagascar, Malawi, Nigeria.

The DAAD is also supporting German universities and research institutions via the Fact-Finding Missions programme. This programme offers the opportunity to realize short-term visits at prospective partner institutions, with the aim to set up long-term collaboration. Furthermore, the DAAD has established the Center for International Academic Collaborations which offers individual advice and assistance. If you are interested to get hands-on consulting and advice, please contact KIWi, the Center for International Academic Collaborations at the DAAD [3].

References

[1] https://naprecanetwork.net/ (15.11.2021)

[2] https://www.programa-trandes.net/en/SDG-Graduate-Schools/YaBiNaPA/index.html (15.11.2021)

[3] KIWi - https://www.daad.de/de/infos-services-fuer-hochschulen/kompetenzzentrum/

Cay Etzold

Cay Etzold is Senior Expert at the new DAAD - Center for International Academic Collaborations (responsible for Sub-Saharan Africa, Eastern Europe, South Caucasus and Central Asia) since October 2021 with experiences of transformations in different contexts and regions.

He studied Latin American Sciences and History at the University of Rostock (Germany) and was awarded a Diploma (M.A.). After his studies he worked at the University of Rostock and later at the Humboldt University Berlin as a Program Officer for the foreign student's office. From 1988 – 1990 he worked at the Department of International Relations of the Ministry of Higher Education of the former GDR as a Scientific Officer. After the German unification he started to work for the DAAD (German Academic Exchange Service) and was responsible for Postgraduate Courses with special relevance to Developing Countries, later for Alumni programs and Higher education cooperation projects etc.

From 2001 till 2005 Cay Etzold was Director of the DAAD Regional Office for Africa in Kenya and from 2009 – 2011 he worked for the European Union in Georgia. Afterwards Cay Etzold was Head of Section Eastern & Southern Africa at the DAAD from March 2011 till December 2014. From January 2015 till June 2019 he was Head of Scholarship Programmes for Africa at the DAAD. From July 2019 till June 2021 he worked again for the European Union in Georgia. He supported the development of the new founded DAAD Regional Office in the South Caucasus in Tiflis and became its first director in July and August 2021 before returning to the Headquarter of the DAAD in Bonn.

Hauwa Ibrahim[1]

De-coding of Violence in Northern Nigeria through Chemistry

August 2008, arriving at Cambridge MA, at the start of Radcliffe Institute Fellows program at Harvard University, USA, I was acquainted with an unassuming intellectual and savvy thinker, Prof. Katharina Al-Shamery, whose research on nano technology (hearing it for the first time) fascinated me. Later I discovered that we both have two children with similar ages. One day Prof. Al-Shamery came to my house. In her humble ways she tried to clean up after meal. She checked the closet down the kitchen sink to pick up detergent and she noticed I also had food stuffs (potatoes, onion etc.) in the same cabinet—she cleaned up and was later to explain chemical reactions and food, careful not to sound like a know-it-all. I was fascinated—the more she explained the more I wanted to hear—Here's where my "baptism" began. A village girl, attending village schools with little or no knowledge of chemistry at Harvard University, coming into knowledge of what Achille Mbembe refers to as the "Anthropocene". The Anthropocene is sometimes used to **simply describe the time during which humans have had a substantial impact on our planet**. Whether or not we are in a new geological age, we are part of a complex, global system and the evidence of our impact on it has become clear.

While the nineteenth century saw the emergence of chemistry as the "central discipline" linking to physics, biology, medicine and materials, the twentieth century witnessed rapid growth of the chemical and allied industries with virtually all the strongest economies incorporating chemical manufacturing. The chemical industry is arguably the most successful and diverse sector of the manufacturing industry. Chemical products go into pharmaceuticals, healthcare, agriculture, food, clothing, cleaning, electronics, transport, aerospace, and the list continues. Green chemistry is another branch of chemistry that deals with the improvement on environmental performance and safety of chemical processes in order to reduce the risks to man and the environment of chemical products.

Chemistry is important because everything you do is chemistry! The idea of chemistry is as old as human being himself. Even our body systems are made of complex interactions of chemicals and reactions. Chemical reactions occur when we breathe, eat, or just sit reading. All matter is made of chemicals, so the importance of chemistry is that it's the study of everything. The essence of chemistry is the study of chemical reactions, the combination of the elements and their compounds to give new compounds.

Nigeria is in a unique position, as the world's seventh-most populous country over 200 million people[2] and projected to become the third-largest country by 2050. While Nigeria is becoming one of the most populous countries in the world, the current educational system struggles to meet the demand and needs of its current citizens. It is becoming unprepared to a certain degree to meet the emerging educational needs of its steadily growing population. In many societies, access to education is a fundamental human right.

For example, the Framework for Action (2000) Dakar argues that education is a fundamental human right. Although federal law mandates access to education in Nigeria, many Nigerians, especially women and girls, still remain uneducated, especially in the rural areas. A report on Global Girls Education complied by the British Council in 2014 reported that Nigeria ranked 153 out of 186 on the Human Development Index (HDI). The HDI is a summary measure for assessing long-term progress in three basic dimensions of human development: a long and healthy life, access to knowledge, and a decent standard of living. The same report also indicated that northeast Nigeria has the most illiterate and uneducated population in the world.

Nigeria, rich with its cultural diversity and natural resources, faces many social and economic challenges that threaten the stability of the country. For many Northern Nigerian youth living in this context often translates into unemployment, social isolation, and hopelessness, making them ripe for anti-social behaviors. Sometimes, under the guise of religion, extremist groups recruit youth by offering them a sense of identity and purpose. Lack of opportunities often place them at risk of involvement with extremist groups such as Boko Haram. Science, technology, engineering, arts and math (STEAM) have the adeptness to pull these pupils *out of the jaws* of Boko Haram.

Hauwa Ibrahim
Nigeria
hauwanah@gmail.com

DOI-Nr.: 10.26125/7rja-0806

[1] Hauwa Ibrahim, J.D., S.J.D., M.L., is the President of The Peace Institute; visiting scholar at Wellesley Centers for Women; Visiting Professor University of Rome; Affiliate of Radcliffe Institute, Harvard University, https://en.wikipedia.org/wiki/Hauwa_Ibrahim

[2] J. Isawa Elaigwu, SECURITY AND PEACE, Adonis & Abbey Publishers Ltd, 2014

In some part of Nigeria formal education has not provided school learners with functional education. Rather, it has continued to turnout half-baked graduates with mere certificates that are almost useless in most labor markets and industries (Jatto. 2004). There is much discrepancy between formal curricular and the present day teaching activities. The basic ideal which has been set to guide the educational system in Nigeria has been the principle that education is good only if it is primary for the sake of developing individuals; that is the mission of education is to teach the individual how to think and act and how to develop and perform skills of his choice for his own benefit and for the benefit of society (Lanford. 2003). That is why the science, Technology, Engineering, Arts and Mathematics (STEAM) is in the process of creating something different with value that will help to redirect the minds of youth and younger ones toward world standard education and increase innovative and creative spirit thereby increasing the number of intellectual younger ones.

There is need to decode violence. Here is how—International collaboration to fight violence giving children and youth alternative to pugnacity through education, especially, the Science, Technology, Engineering, Arts and Mathematics (STEAM) education, specifically Chemistry, knowing that each child is endeared with intelligence, initiatives and creativity. Chemistry certainly pulls out the creativity and encourages engagements, rather than joining extremist ideology – an opium for the powerless, illiterate and poor.

Chemistry as a tool of decoding the code violence: we can do—we are doing it— In collaboration with University of Rome students[3], Wellesley Centers for Women (WCW), Corinne Cressman, Stacy Scott, Arlene Lieberman and many more during the summer 2019. It certainly went beyond the limit of a class lesson plan and other limitation. The curriculum developed with students gave pupils in the three camps motivation, creativity, desire for the impossible, to be passionate and intense. The focus was on social-change, providing for the (STEAM) Summer camps, to thrive beyond once off. It provided the space to think, create, innovate, criticize and strategize for coming years. The vision is for a future that has an expanded student-centered science experiments and science education for communities regardless of language barriers or previous science education.

Three communities in two states of North eastern Nigeria hosted the three camps, thus— Bauchi town, Hinna Village, and Gombe city, championed by the Shehu Usman Abubakar Foundation. Over 100 schools were represented and the camps attracted over 1,200 pupils aged 10-14. The pupils' engagement and joy with each subject left us all in awe. The student-centered, interdisciplinary, community-engaged, culturally responsive, and sensitive, hands-on summer camps used over 80% of materials found in the localities, inspiring the pupils to think through each process critically, while shining their "inward little lights" brighter, better and growing confident on the ability to be the best—they did.

With minimal instructions, pupils performed science experiments related to density, pH indicators (Bases & acids), osmosis, bodily reflexes and reactions, the period of pendulum, genetics (recessive & dominant), fingerprints analyses, Oobleck, and blood typing kits. In technology and engineering classes, students had the opportunity to build baking soda and vinegar-powered rockets, create support structures to absorb shock to prevent eggs from breaking when dropped from the second floor of a building, and make self-supporting da-Vinci bridges.

Our Chemistry syllabus was robust, few of the activities, the equipment's used and how we did the activities, included:

Activity 1: pH Indicator
Time: 45 minutes

Description: Students learn about pH level and differentiate between acids and bases using everyday items (i.e. local materials).

Materials:
- Pencil
- Paper
- Hibiscus tea (sobo)
- Vinegar
- Lemon juice
- Baking soda mixed with water
- Bleach
- Dish soap mixed with water
- Pipettes
- Test tubes

Instructions:
- Before the experiment, there was thorough explanation of pH, the pH scale, the meaning of acids and bases and what an indicator is (the hibiscus tea changes color to identify whether something is an acid or a base, red for acid, blue/black/yellow for base).
- Divide class into groups.
- Allow the students to do the experiment of mixing hibiscus tea with the other liquids (lemon, vinegar, soap, bleach, baking soda) making sure they don't use the same pipette for different liquids as it changes the result of the experiment.
- Have the students write down whether each liquid is an acid or a base followed by each group sharing their results with the class.
- If there are any mistakes with the results, have a group discussion about what could have went wrong in the experiment and how we can improve, if we were to do the experiment again.
  Key:
  Soap → base (turns blue/black)
  Vinegar → acid (stays red)
  Bleach → base (yellow)
  Baking soda → base (black/blue)
  Lemon → acid (red)

[3] Our team of students from the University of Rome were: Simon Muhlbauer, Rodrigo Vassallo, Cornelius Balle, Masa Awad, and Sadeen Qurdan

Activity 2: Density
Time: 60 minutes

Description: Students will learn about density by discussing and then experimenting with materials, specifically via the separation of water and oil due to their different densities.

Material:
- Hibiscus tea
- Hibiscus oil

Instructions:
- Brief explanation of the meaning of density along with questions asked to the group to elaborate (what is heavier, a box of flour or a box of the same measurements full of iron, a pound of gold or a pound of feathers?).
- Follow with a brief experiment of having the students mix the tea and oil in a clean test tube and seeing how they separate (the experiment will not work if there is any soap in the test tube).
- Followed with an explanation of why water and oil do not mix (oil is hydrophobic).
- Allow time for any questions

Activity 3: Oobleck Exploration
Time: 60 minutes

Description: Students will explore the physical properties of state by playing with oobleck, which is neither a liquid nor a solid. They will make and then interact with the material observing and discussing its properties.

Material:
- Cornflour
- Water

Instructions:
- Explain to students what non-newtonian fluids are (fluids that don't respond to normal laws of viscosity and are "irregular matter"). When mixing cornflour and water, it creates a fluid that responds to strong force as a solid but is liquid when no force is applied to it.
- Have the students mix cornflour and water in a bowl (only helping them if they added too much water by adding extra cornflour for them), they can take turns punching the bowl, then slowly putting their fingers in.

Activity 4: Blood Typing Kit
Time: 60 minutes

Description: Students will learn about blood and the various types as well as why they are determined and helpful. They will then discover their own blood type.

Materials:

- Blood typing kit

Instructions:
- Explain to students what blood types are and how they are determined (A antigen, B antigen to determine the ABO blood types, Rh to determine whether it is positive or negative).
- Follow by giving them a scenario of a break in a house, where the criminal leaves blood traces on the floor, and the students are the "forensic scientists" that have to match the suspects' blood to the person who broke into the house by using the blood typing kit.
- After they find out which suspect was the guilty person, explain to the class another reason why blood typing is important: blood transfusions. The human body will reject any antigens it doesn't originally have (for example a person with blood type A will reject type B blood). Therefore it is important to know which blood types can donate to which blood types.

Our long term goal is to positively impact the STEAM education by creating cultural appropriate curriculum incorporating all aspects of STEAM, using items in localities and communities to see children in communities be independent with skills and knowledge to compete in local, regional and global economy as well as reduce youth unemployment by teaching youth cultural traditions and entrepreneurial skills that can be used to generate income. Since the schools belong to the community, we will encourage the culture of ownership of the school STEAM curriculum. Another alternative education initiative is to slow down dropped out of school, such as working children and children in conflict situations, to get instruction through education centers established outside the formal school system. Example—enroll in learning centers or satellite schools using local languages, parental engagement and lower average of student-to teacher ratio, while encouraging community friendly projects with community involvement.

Hauwa Ibrahim

Hauwa Ibrahim is the President, The Peace Institute (TPI, http://thepeaceinstitute.global) with offices in the USA, Italy and Nigeria; Visiting Professor University of Rome, Italy 2013-date; Visiting Lecturer, Harvard Divinity School 2010-2013; Fellow at the Radcliffe Institute, and Harvard Law School. Lawyer, author and mother. President Jonathan appointed her (2014), to join the effort for the rescue of 219 girls kidnapped by Boko Haram. Acting President Prof. Yemi Osinbanjo appointed her (2017) to Review Nigerian Armed Forces compliance with Human Rights Obligations. 2020-2021 she spent the academic Year at University of Oxford, United Kingdom focusing on the *Phenomenology of Mother's Soft Power*. She is a Laureate of the European Parliament 2005 Sakharov Prize for Freedom of Thought.

BUNSEN-MAGAZIN · 24. JAHRGANG · 1/2022

Nassifatou Koko Tittikpina

Chemistry in Africa : Case of Togo (West Africa)

1. Chemical education in Togo

Training in Togo has been influenced by German, Anglo-Saxon and French models. At present, the education system is comparable to that of France and for higher education, it also follows that of the European Union (Bachelor Master and Doctorate). The educational system is divided into four parts: primary school, secondary school, high school and university. The University of Lomé and the University of Kara are the two public universities in the country. Primary school consists of 6 grades where one teacher is in charge of all the topics to be taught in the class. Chemical education starts at the primary school where subjects are not distinct but mixed in various chapters taught by the same teacher. Chemistry is included in a chapter named 'science and technology'. At that level, initiation and sparkling interest to chemical sciences are the main objectives of the teaching.

The secondary school is made of 4 grades where there is one teacher per subject to be taught. Here, one teacher is in charge of one subject where chemical education is a distinct subject and it is taught with physics. During chemical classes, students learn the basics in chemical sciences: components of a matter, different types of matters, principles of a chemical reaction, mathematical rules controlling a chemical reaction,... At the end of the secondary school there is a national exam. Students who pass the national exam, have two choices at high school level: vocational high school and regular high school.

The high school consists of 3 grades where teaching is also similar as in the secondary school level with one teacher per subject. Each subject is extensively developed and takes a large percentage of the timetable, students also have classes in other subjects from the other options but for those subjects, just notions and essential elements are taught. In vocational high school, students are oriented into the following options: accounting and finance (G2), secretariat (G1), trade and marketing (G3), technology and engineering (E, F1 to F3). In the regular high school, the following options are available: literature (A), natural sciences (D), mathematics and physics-chemistry (C). In high school, teachers go deeper in the teaching of chemical sciences depending on the options chosen by students. Students in vocational high school do not have classes in chemistry and physics except the technology and engineering students.

University education is organised like in most universities around the world and follows France university system. The university is the centre of specialized teaching. Students who do not need chemistry in their future jobs do not take chemistry classes. Specialized courses where a focus is put on chemistry are pharmaceutical sciences and chemical sciences. Students studying those sciences have a large part of their curriculum centred around chemistry subdisciplines: organic chemistry, analytical chemistry, thermodynamics, therapeutical chemistry, mineral chemistry, inorganic chemistry, etc... Students in engineering sciences, medical sciences, natural sciences, mathematics and physics are just given some notions of chemistry during their studies.

In conclusion, chemical education starts at an early age for a Togolese child. Depending on the talent of the student and what he desires to do as a future career, the young Togolese at age 14 could decide to have a chemistry focused learning life or not.

2. Jobs in chemistry in Togo

Jobs are scarce in the chemical field in the country. The main reason is the scarcity of industries in general and those in the chemical field in particular. The industries available in the country where chemists could work are: the extractive industries (phosphates, cement), the food and pharmaceutical industries. Unfortunately, due to the absence of quality control, and research and development laboratories in those industries (absence of manufacturing of new products, quality control made by other partners from abroad), few chemical jobs are available and could be numbered to at least one ten or at most two tens. Jobs in chemistry are mainly in the education field, teaching: a lot at secondary and high school levels and only a few at university levels. The second sector where jobs are available is the pharmaceutical sector field. In this domain, working as a pharmacist in a retail drugstore is the main job of occupation, followed by work as pharmacist in the distribution of pharmaceutical products and in the public sector. In the pharmaceutical sector, working as a pharmacist chemist is rare. Indeed, the limited number of pharmaceutical industries make it almost impossible to find a job in the field. In fact, there is less than ten people holders of a chemistry-centred degree (bachelor, pharmacist or pharmacist with an additional degree in chemistry) working in the pharmaceutical industry.

Dr. Nassifatou Koko Tittikpina
knassifa@yahoo.fr

Zurück zum Inhaltsverzeichnis

3. Challenges in chemical sciences education in Togo

The first issue in chemical education in the country is the lack, suitability and or appropriateness of practical classes starting from the secondary school and high school till the university level. Without practical training in the chemistry laboratory, the teaching of chemistry remains incomplete and unattractive to many students. At the university level, because of the huge number of students and the lack of human resources, infrastructure and equipment, students do not have the opportunity to gain practical skills in chemical sciences. Fortunately, in the last years, efforts have been put into place to increase qualified human resources needed in chemical sciences education. For example, vocational schools at the university level have been renovated and restarted. An example is the one for the training of teachers of secondary and high school in chemical sciences and physics (a bachelor degree program for teachers for secondary school level and master degree program for teachers for high school level). Few Togolese schools have science laboratories. To make up for this lack, a project called „Molab“, piloted by the United States Embassy in Togo, is committed to bringing science and technology into the country‘s schools thanks to a bus that now travels around Togo‘s schools to allow students to combine theory with practice.

In addition, at the university level, new programs are being introduced to help improve the level of students in practice or experimental chemistry. For example, the Faculty of Sciences at both the University of Lome and the University of Kara in partnership with the ‘Université Toulouse III Paul Sabatier’, ‘Aix-Marseille Université’ and ‘Université de Lille’ from France, the ‘Université Félix Houphouët Boigny (UFHB)’, ‘Université Jean Lorougnon Guédé’ and ‘Université Nangui Abrogoua’ from Côte d’Ivoire have established a joint project called PULSE, which is funded by the European commission through its ERASMUS PLUS program. The project aim is to establish an online platform for the practical classes in chemistry, physics and biological sciences for students in 1st and 2nd year of bachelor degree programs available in the partner universities from Togo and Côte d’Ivoire. This program is innovative as it will be the first of its kind in the west African region. In pharmaceutical sciences where practical teaching is essential, a considerable effort has been made within the Pharmacy Department of the Faculty of Health Sciences of the University of Lomé to install and equip practical work rooms in all pharmaceutical disciplines thanks to the support of the Pierre Fabre Foundation for over ten years. Young lecturers, trained abroad, are now able to respond to calls for projects from international organisations (WHO, UNDP, OWSD, TWAS, EU, etc.) and participate themselves in the scientific equipment of their faculty with the funds granted. Efforts are still needed to attain the level required for a certain quality standard in chemical sciences education. This requires efforts from educators, students, government and international organizations.

Dr. Nassifatou Koko Tittikpina

Nassifatou Koko Tittikpina is teaching at the Faculty of health sciences of the University of Lomé in Togo (West Africa). She is in charge of the analytical chemistry and bromatology practical, tutorials and some courses directed to students in pharmaceutical sciences at the University of Lomé and also to students in pharmaceutical assistantship at the ‘Ecole Nationale des Auxiliaires Médicaux’ (National School of Medical auxiliaries), under the supervision of Prof Yerim Mbagnick Diop and Prof Batomayena Bakoma.

Besides, she is a pharmacist at the National Authority of Pharmaceutical Regulation (Direction de la Pharmacie, du Médicament et des Laboratoires) where she is in charge of the relaunch of the activities of the National Quality Control Laboratory of health products with the aim to lead it to be a certified ISO 17025 or WHO (World Health Organization) prequalified laboratory.

Nassifatou Koko Tittikpina graduated from University of Lomé (Togo) in 2012 with a Pharmaceutical Doctor degree and from the University of Saarland (Germany) and University of Lorraine (France) in 2017 with a PhD in analytical chemistry and a PhD in natural sciences.

She is a former Faculty for the Future Fellow (Schlumberger foundation), a former Pierre Fabre Foundation post-doctoral fellow. She is a current Early Career Fellow from the Organization of Women in the Developing World (OWSD) and a Fullbright African Scholar Fellow.

BUNSEN-MAGAZIN · 24. JAHRGANG · 1/2022

Willis Collins Akeyo Muganda

Chemical Education and Chemistry Jobs in Kenya – Personal Experience and Overview

About me

I grew up and went to school in Kenya, later I began studying chemistry in Kenya and worked at different companies as a technician before moving to Germany to pursue my master degree at the University of Siegen. Currently, I am completing a PhD in Chemistry with specialization in Physical Chemistry at the same university. My passion is in social voluntary engagements and sustainability topics. For about 7 years I have been actively engaged in young chemist activities in Germany and globally. For a long time, it was an unusual feeling being the first and only African actively involved in the young chemist section of the German Chemical Society (GDCh) popularly known as JungChemikerForum (JCF). This is not to mean that there are no African students studying chemistry in Germany. However, the majority has not found it easy to integrate and network with other scientists (probably due to language and cultural differences). Between 2017 and 2019, I served in the national board of JCF as a deputy chairperson and in charge of International Relations and Advertising. Together with my team in the board, we reinforced our international network and built a strong foundation for equal opportunities within all young chemists in Germany. To date, I am proud that many young chemists within Germany from other parts of the world are involved in various activities of JCF. Currently, I co-chair the finance team in International Younger Chemists Network (IYCN), which is a global association of younger chemists under International Union for Pure and Applied Chemistry (IUPAC). Apart from that I am also in the board of the division of Association of Chemistry and Economics in the GDCh.

Kenya is known to be among the top tourist destinations globally. The general infrastructure and economic standards have been rising steadily for over a decade now. However, the rate of unemployment has immensely stagnated. The possible explanation for this could be either there is an overflow of graduates in the country or there are not enough industries to offer employment. The former is true! Many students graduate with degrees and end up working unwillingly in informal sectors. Tribalism and poverty are to blame for the increase in unemployment. A close friend of mine Peter who was the best chemistry student at the university ended up working in a supermarket as a shelf personnel. His frustration was immense that he decided to burn his academic certificates. Another friend John who also studied with Peter failed all his chemistry courses at the university and ended up being employed by the government as a civil servant. Caroline the girlfriend to John who also failed her chemistry exams but comes from a rich family decided to go abroad because the parents could afford it and excels in her career. These three situations describe how the system can build or destroy the life of a student. It is amazing that through DAAD funding, some of the talented students get a second life to further their education.

The competition between private and public universities has positively contributed to the introduction of diverse degree programs and collaborations with other international universities globally. However, the university fees are still not affordable for the average Kenyan student. The mostly affected are the female students. In 2016, a report from the *COMMISSION FOR UNIVERSITY EDUCATION, Quality: The Agenda STATE OF UNIVERSITY EDUCATION IN KENYA* highlighted the disparity in enrollment between male and female students. The highest disparity was noted at the PhD enrollment, of which the ratio of male to female was over 2:1. The total admissions in both private and public universities was 539,749 with private universities managing to enroll only 77,929 representing 14%, while public universities reached 461,820 (86%). The highest admission was recorded for bachelor students (475,750), masters 55,461, PhDs (7146) and post graduate diploma (1,392). The demand for post graduate education is still low. This is attributed to the high fees, lack of funding opportunities and unemployment. The majority of the Kenyan students would prefer to seek for job opportunities immediately after the bachelor degree than rather further education. In comparison to the rising population in Kenya, these admissions at the Universities are still very low. In fact, the enrollment to life sciences and physical sciences is only at 6.4% and the majority being male students. Even for the “lucky ones” who manage to get university admission, the chase for academic excellence is comprised by a lack of the necessary resources.

During my entire period in Kenya studying chemistry, I rarely got the opportunity to participate in lab courses and if they were offered, I had to work in a larger group of about 8 to 10 people. This was because shortage of equipment, chemicals and qualified staff to supervise the lab course. Compared to what I have seen in Germany, this is a huge deficit in terms of practical

Willis Collins Akeyo Muganda, M. Sc.
Universität Siegen - Fakultät IV
Department Chemie-Biologie, Physikalische Chemie I
Adolf-Reichwein-Straße 2, D-57076 Siegen
muganda@chemie.uni-siegen.de

Zurück zum Inhaltsverzeichnis

skills to chemistry students in Kenya. In my opinion, one can solve this problem by also offering exchange opportunities to bachelor and master students abroad e.g., Germany at least for 6 months. Currently I am not sure if this is supported by DAAD. Furthermore, more funding would be needed for relevant and emerging topics that foster innovation and sustainability. I believe if Academia and Chemical Industries both locally and internationally can work together to introduce the Start-up Culture in Kenya, this will open doors to new opportunities. Hence, create self-employment to the talented students who wish to work in the industry. Currently, I have been in contact with Start-ups in Kenya with brilliant ideas but seem to lack the required skills to market their products and attract funding. I have dreamt to initiate a cross international mentorship program between scholars from Germany and aspiring students and scholars in Kenya. I strongly believe institutes like DAAD, GDCh and Deutsche Bunsen-Gesellschaft für physikalische Chemie through their network and structures can implement this better.

Finally, in the light of achieving the Sustainable Development Goals (SDGs) especially 4 (Quality Education), 9 (Industry, Innovation and Infrastructure) and 10 (Reduced Inequalities): I believe luck and fate should not be the deciding factor of a Kenyan student to excel in his/her academic career.

BUNSEN-MAGAZIN · 24. JAHRGANG · 1/2022

Waithera Wambugu

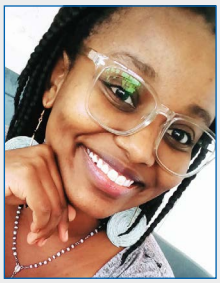
The State of the Chemical Ecosystem in Kenya

Tertiary-level education in chemistry in Kenya is relatively young, typically not more than 100 years old. The preliminary stages of modern chemistry in Kenya just like in most African countries found their roots primarily in natural products research. This tradition of natural product research has remained strong. A great diversity of plant species grows in Kenya, and the country estimates over 20 million people who routinely use indigenous medicine; a combination that has naturally attracted the attention of scientists to various plant families.

According to a publication by Gitari P. (2013), several plants like *Warbugia ugandensis* Sprague is highly esteemed for its valuable pharmaceutical properties and is rated as second highest priority medicinal plant species in Kenya for detailed study. Warburganal and muzigadial from *W. ugandensis* exhibit very potent antifungal, anti yeast and plant-growth regulating activity. *Withania somnifera* (L.) Dunal contains more than 80 chemical compounds, mainly alkaloids and steroids (withanolides). Numerous studies have been published on the activities of these compounds, mostly obtained from the leaves and roots. These studies have demonstrated antibiotic, anti-inflammatory, cytotoxic, anti-tumor and cholesterol-lowering activities. The chemistry of *W. somnifera* has been extensively studied and over 35 chemical constituents have been identified, extracted, and isolated. The biologically active chemical constituents are alkaloids (isopelletierine, anaferine), steroidal lactones (withanolides, withaferin), saponins containing an additional acyl group (sitoindoside VII and VIII), and withanolides with a glucose at carbon 27 (sitoindoside IX and X). *W. somnifera* is also rich in iron.

In this context, the Kenyan Government has recently been increasing its budget for research into indigenous knowledge bolstering the prospects of a continuing interest in natural product chemistry. The use of advances in information and communication technologies to provide access to expensive research facilities among natural product chemists in the country will augment the research work and increase the number of peer-reviewed publications from Kenyan researchers. The availability of well-respected national and regional publications of high quality and relevance will equally heighten the publication metrics of Kenyan researchers in the global context.

In conclusion, Kenyan chemistry will still need nurturing to reach the same level of productivity as that of developed countries. This will require improving the research conditions in the country. Technology transfer from industrialized countries is not sufficient, and indeed is not what is needed. Collaborations both within Africa and overseas, engagement with local communities, and building knowledge on traditionally strong areas are all suitable routes alongside the increasing enthusiasm and innovation of students and young researchers to develop high-quality chemistry.



Waithera Wambugu

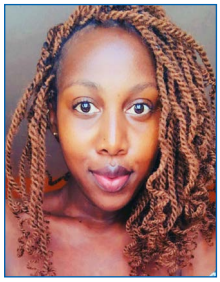
Youth Correspondent based in Nairobi who works to promote and advocate for greater international cooperation between Europe, the US, and Africa. Through organizing TEDx talks in Nairobi, she has achieved her dream of enabling the young people in her community to narrate stories that are redefining the African Narrative and changing the world's perspective about Africa through a global platform. Waithera holds a Bachelor of Science degree in Industrial Chemistry that she intends to utilize in redesigning products and processes that will eliminate the use of hazardous substances that are currently degrading the environment.

Waithera Wambugu
Partnerships Coordinator
Nairobi, Kenya
waitherawambugu1830@gmail.com

Zurück zum Inhaltsverzeichnis

Bwari Ondima

Chemistry in Kenya

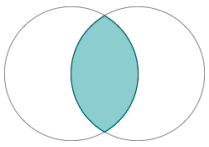


My name is Bwari Ondima, 23, Kenyan. Graduated with a Bachelor's degree in Industrial Chemistry from Jomo Kenyatta University of Agriculture and Technology. I am a Quality Control Analyst, Leader, Project Manager, Social Media & Content Creator and Entrepreneur.

My relationship with chemistry began when I was 14. That is when I realized how much I loved reading about the science of the properties, composition, and structure of substances and the transformations they undergo. How chemistry is not just confined in the laboratory but is in everything that happens around and within us. This was very fascinating and it led to my dream of becoming a Chemical Engineer. This dream later changed to being a pharmacologist with a specific focus on drug discovery and manufacturing but still committed to the chemistry of properties.

In 2016 I was admitted to campus to study bachelor of science in Industrial Chemistry. First culture shock that is not so much of a Kenyan but also a world wide thing, two thirds of the class was made up of males and the rest was female. Definitely something that is common across most countries in the STEM department. I must say, after coming from an all girls high school, meeting this reality was a bit intimidating.

My four years of studying different areas of chemistry; the organic, inorganic, analytical, spectroscopy, environmental, nuclear, polymer and others, made my passion grow. Everyday of doing this, in class, in the laboratory and during my internships during the holiday breaks gave me a better purpose: Making the world a better place. And this was the root of my connection between SDG 3, 13 and Chemistry.



Most scientists are assumed to be people whose lives will be in the laboratory, people who are not as outgoing or social, but I found the sweet spot between the two circles: **Chemistry and Social Impact**. This is what I'm all about.

SDG 3, Good health and well-being; I have conducted a medical camp in the slums as a Project Lead and Vision Bearer in the year 2019 and my 10 year plan is to have 4 more. Once I major in Pharmacology, I'd love to work with people doing drug discovery and come up with a way to have affordable drugs for people who aren't able to get access to this. I am also open to people willing to work with me in this dream in different ways.

SDG 13, Climate Action; whatever we are manufacturing determines how our climate is being affected. We can ask people not to litter and to plant trees but also, it's the responsibility of us Chemists to come up with eco-friendly replacements of plastic and other polymers affecting us that will also help reduce mass production of harmful products. This, I cannot do alone but with my society of Chemists.

Education in Kenya is the best I've had. It will have you learning about all the theoretical and laboratory things but that is just it. How you use what you studied to make an impact and not just have it as any other routine to just be in the Laboratory day in, day out,is up to you. Therefore, it's the responsibility of all of us to find meaning in what we do to give meaning to others. We have more to give than we think. One thing that can be looked into is affordable chemistry clubs/ societies especially for immediate graduates and entry level chemists who don't have the student subsidized registration fee or enough salary to meet the fee required by people already working.

The job industry in Kenya is very competitive. I'd say, we have top 10 Manufacturing companies that every chemist wants to work for in Kenya but not all of us end up in them. We are a growing economy so we have so many companies for chemists to work for but the main challenge is the salary scale. Some companies pay very little money, especially for entry level people and expect so many hours in return and that has many people shifting their career to where they can earn money that matches the work they're putting in.

We also have a very high rate of unemployment, which leads to people doing jobs not related to what they studied at school. Another challenge I can mention is we do not have adequate well equipped laboratories and that leads to most scholars going to do their masters and PHD abroad. This means the intelligent minds and brains that would otherwise lead to building our country are out there building other countries as most people do not come back home after.

My love for Chemistry still remains. I am excited about my future as a woman in Chemistry. I believe I will get a chance to get my Masters in Pharmacology and inspire, impact and build my home, Kenya. I believe Kenya, and Africa as a whole, has amazing opportunities for growth and especially in the science world.

Bwari Ondima
Kenya
ondimabwari@gmail.com

Nico Fischer and Jack Fletcher

Chemical Engineering Research in South Africa

Research foci

Technical chemistry or chemical engineering research has a rich history in South Africa. With the first official bachelor's degree offered in 1920 at the University of Cape Town (UCT), a mere 2 years after the establishment of UCT as first national university in the country. From the early days, the rich South African mineral resources guided research activities and the wider field of minerals processing remains one of the key drivers. This includes mechanical processes like comminution and classification, hydro- and pyrometallurgy as well as flotation studies. With an increased understanding and focus on sustainability, wastewater treatment from mining operations has become increasingly important. Using physical, chemical and biological approaches, existing wastewater streams are being treated both to yield clean or at least re-usable water and to extract valuable mineral resources. The developing sustainable hydrometallurgy also expands from classic ores to waste streams as feedstock in a push towards a circular (mining) economy.

A second major research strand focuses on energy. In the early years this was mostly related to the direct generation of power from the vast coal reserves in the northeast of South Africa. The political isolation of the apartheid regime forced South African industry to find alternatives to crude oil which resulted in the adoption of the Fischer-Tropsch (FT) technology based on coal liquefaction in the 1950s through the South African Coal, Oil and Gas Corporation (SASOL). During SASOL's expansion in the early 1980's and a gradual switch from coal to natural gas as feed stock, the family of processes around the actual FT synthesis guided academic research efforts. Product upgrading through the alkylation of phenols, oligomerization of olefins, functionalization of alkanes and hydrocracking of FT waxes are just some of the research projects conducted in parallel to studies on the FT catalyst and process itself.

Through low oil prices and a growing environmental consciousness, the FT synthesis fell into some disrepute in the early 21st century and new plants were only developed in China, where coal remains the main feedstock. However, the advent of the Power-to-X (PtX) concept, has identified FT as a viable option to generate synthetic hydrocarbons from CO_2.

The fundamental requirement for the large-scale implementation of PtX technologies is the availability of green hydrogen, i.e. hydrogen that is produced through the use of renewable energy via electrolysis or thermal (catalytic) water splitting. When CO_2 is used as carbon source, PtX products can act as drop in solutions in chemical processes and as hydrocarbon fuels in difficult to electrify sectors such as the aviation industry or, in form of green/synthetic LPG, as a local enabler for social upliftment of previously disadvantaged communities.

Associate Prof. Dr. Nico Fischer and Prof. Dr. Jack CQ Fletcher
Catalysis Institute
Department of Chemical Engineering
University of Cape Town
Madiba Circle, 7701 Rondebosch, Cape Town
Nico.Fischer@uct.ac.za
Jack.Fletcher@uct.ac.za
www.catalysisinstitute.uct.ac.za

Prof. Dr. Megan Becker
Associate Professor
Centre for Minerals Research (CMR)
Dep. of Chemical Engineering
University of Cape Town
megan.becker@uct.ac.za

Coming from a background in geological sciences, Megan joined the then Mineral Processing Research Unit (now Centre for Minerals Research) with the mandate to integrate mineralogy into the research activities of the group. The central focus of her research is the application of mineralogical knowledge for the understanding, optimisation, and prediction of key unit processes within the mining industry from both techno-economic and environmental aspects. This research is enabled by a variety of analytical equipment enabling the mineralogical characterisation of ores and their textures in both two and three-dimensions. Megan has a strong focus on PGE and base metal ores and on understanding how the effects of the naturally occurring weathering, hydrothermal alteration and oxidation processes affect both the behaviour of the valuable and gangue minerals during processing and how this can be mitigated. In the last few years, her research has expanded into geometallurgy that is focused on developing tools for better managing ore variability during the project and operational stages of the mine. She also works closely with various mining operations in South Africa providing much needed support in mineralogical characterisation and interpretation of essential data to optimise their process flowsheets.

Dr. Elaine Opitz
Lecturer
Centre for Bioprocess Engineering Research (CeBER)
Dep. of Chemical Engineering
University of Cape Town
elaine.optitz@uct.ac.za

Elaine's main research activities focus on understanding the fundamental mechanisms that govern microbial enhanced dissolution of valuable metals from mineral bioleaching systems.
Aside from developing novel approaches to simulate these large-scale operations in the laboratory, she focuses on developing mathematical models to describe complex bio-hydrometallurgical interactions in heterogeneous reactor systems. This knowledge is also applied to the prevention and mitigation of pollution from mine waste streams since the same mechanisms govern acid rock drainage generation and lead to toxic metal deportment. The knowledge gained from bioleaching of mineral sulphides is applied to the extraction of valuable metals from electronic wastes. Her e-waste associated projects focus on quantifying metal leaching kinetics and modelling the performance of various reactor configurations with the aim of developing process flowsheets for the extraction and recovery of economic value from metal-rich waste streams that are scalable for application in small, medium, and micro enterprises.
Her trans-disciplinary research focuses on the impact of mining activities on rural-urban linkages associated with land use and water resource management and its effect on the sustainability and resilience of communities during the life of the mine and post mine closure.

On the other hand, PtX products such as ammonia, serve as a renewable energy carrier for the expected future global energy trade. South Africa has a unique opportunity to play a leading role in this global 'Energiewende'. The country not only holds the vast majority of the earth's known platinum group metal reserves, a crucial element for electro and environmental catalysis, but is also blessed with ample renewable energy generation potential in form of solar and wind. In 2007, electrocatalysis research was kickstarted by the inception of the government-funded Hydrogen South Africa (HySA) Centres of Competence focusing on the development of local IP in fuels cell and electrolysis technology, to gradually move from a resource to a technology-based economy. In combination with the existing and growing expertise in sustainable mining/minerals processing, heterogeneous catalysis, and a growing capacity of installed renewable energy generation, the HySA programme provides the last piece of the puzzle to cement South Africa's position as future renewable energy exporter.

Dr. Rhiyaad Mohamed
Senior Research Officer
Catalysis Institute and DSI Centre of Competence HySA Catalysis
Dep. of Chemical Engineering
University of Cape Town
rhiyaad.mohamed@uct.ac.za

Rhiyaad leads the electrolyser research and development activities for the HySA Catalysis Centre of Competence. He himself was one of the first PhD graduates from the Centre and has expertise in electrocatalyst development for fuel cells and electrolysers.
With electrolysis said to play a major role in the PtX scheme and a global shift towards renewable hydrogen as a potential clean energy carrier, his research group, started in 2017 is mostly funded through the HySA programme and is responsible for the development of commercially relevant platinum group metal catalyst-based technologies for electrolyser applications. His research aims to understand the critical electrochemical processes associated with electrolysis and the oxygen evolution reaction, offering promising alternatives to the current energy landscape. The work is focused on exploiting the fundamental physical and electrochemical properties of oxide-based materials to advance this field of research and facilitate the rational design of the next-generation materials.

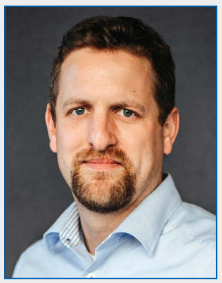
Funding opportunities

Funding is always a challenge in academic research but is probably exacerbated in developing countries. The pool of industry partners and government institutions that can supply funding is limited. Within South Africa, the main academic funding agency is the National Research Foundation (NRF), an organ of the national Department of Science and Innovation (DSI). The NRF offers individual funding opportunities for researchers and postgraduate students. The values are modest, especially for expensive and equipment heavy research areas such as chemical engineering, with grants hardly ever surpassing R 1 000 000 per year (approximately € 60 000). One of the challenges associated with NRF administered grants, is the lack of salary funding. This especially impacts on the possibility to offer early career researchers entry level positions enabling a growth of the research capacity in the country. The DSI has developed some additional funding mechanisms in form of Centres of Excellence and Centres of Competence which focus on pre-defined research areas and are provided with continued funding for up to 15 years. The South African Research Chairs Initiative (SARChI) is similar but focused on a single senior academic with expertise in a specific field.

Some international funding agencies, especially from Europe, allow South African participation and are highly sought after and very competitive. These often provide the basis for productive international collaborations with large consortia of researchers which survive beyond the immediate funding cycle.

In this environment, contractual work for local and international industry partners is essential. While in some instances limiting the possible academic outputs, these partnerships, on national level especially with SASOL and various mining companies, have enabled academic research immensely. They provide essential funding for salaries, equipment, running costs and student bursaries without which, the impact of South African chemical engineering research would be markedly reduced.

Prof. Dr. Nico Fischer
Associate Professor
Catalysis Institute and DSI-NRF Centre of Excellence in Catalysis c*change
Dep. of Chemical Engineering
University of Cape Town
nico.fischer@uct.ac.za



Nico was born in Heidelberg, Germany. After spending part of his youth in Mexico, he finished high school in Germany and went on to study Chemical Engineering at the Karlsruhe Institute of Technology. He graduated with a Dipl.-Ing. in 2007, working for his MSc thesis on a combination of the Fischer-Tropsch synthesis and hydrocracking under the supervision of Prof. Schaub and mentorship of the late Prof. Schulz at the Engler-Bunte-Institut. While there is no evidence for any family relationship, the Fischer-Tropsch synthesis captivated him, and he moved to the University of Cape Town for his PhD thesis, studying the structure sensitivity of cobalt model catalysts. After graduation he accepted a position as research team leader in selective oxidation catalyst research at BASF SE in Ludwigshafen in June 2011. Only two and a half years later he received an offer to return to the University of Cape Town, first as Senior Research Officer, since 2018 as Associate Professor. At the Catalysis Institute, Nico's research focuses on the development and design of novel catalytic materials used predominantly in synthesis gas conversion and CO_2 activation reactions with a strong focus on *in situ* and *operando* material characterization.

Prof. Dr. Jack CQ Fletcher
Professor
Director of the Catalysis Institute
Dep. of Chemical Engineering
University of Cape Town
jack.fletcher@uct.ac.za

Other than for 5 years in III-V semiconductor research, Jack's entire career has been in the field of catalysis, focused principally in synthetic fuels & chemicals, more recently in hydrogen and PtX technologies. He has worked in all of universities, government laboratories and private enterprise. Formerly the Director of R&D for Süd-Chemie AG (now Clariant AG), he is currently Director of the Catalysis Institute at the University of Cape Town where he founded both the DSI-NRF Centre of Excellence in Catalysis (c*change) and the National Hydrogen Catalysis Competence Centre (*HySA*/Catalysis). He is a past Chair of the Scientific Advisory Council of the Helmholtz Centre Berlin (HZB) and serves as an elected Fellow of the South African Academy of Engineering (SAAE).

Marina Koch-Krumrei*, Lucian Brujan
with contributions from Ruth Narmann and Christian Weidlich

Science Diplomacy: Translating Science into International Affairs

The contribution of the German National Academy of Sciences Leopoldina

The concept of science diplomacy

Science diplomacy (SD) is a term used to describe the interaction between scientists (and their work) and diplomacy and foreign policy. SD builds upon the evidence, reputation, networks and entire repertoire of science to improve international relations. When official channels are restricted or when the political situation/relationship is difficult, SD can help to maintain or restore trust, build credibility and enable a constructive approach through formats off the beaten track of politics. SD can be an influential tool in building bridges between societies and states, and for developing common strategies to address global challenges. SD also supports scientists subject to repression and human rights violations.

By definition, science transcends borders; by self-conception, science uses a universal language and set of academic standards. Therefore, SD is versatile, forging channels and formats ranging from traditional international scientific exchange to multinational research undertakings or infrastructures to scientific advice. Accordingly, it engages a broad range of actors, from scientists and science managers to embassy staff and policy-makers. Its effectiveness depends considerably on the context and timeframe. It can work by official mandate of a government or it can be a genuine grass-roots action. The goals of SD can vary from idealistic to normative to pragmatic. It is widely accepted that SD is a form of "soft power", sometimes with long-term effect.

Although a recent term, SD's historic roots date back to the late Enlightenment, proving notable achievements during the Cold War (such as the Soviet-American scientific exchange). The visit of German scientists from the Max Planck Society to Israel's Weizmann Institute of Science in 1959, before the establishment of diplomatic relations in 1965, proved to be a remarkable landmark of German SD. Several bilateral visits, research fellowships and the creation of the Minerva Foundation for Israeli-German academic exchange followed.

Leopoldina's science diplomacy

In 2008, Leopoldina was appointed Germany's National Academy of Sciences. In this capacity, it was invested with two mandates: to represent the German scientific community internationally and to provide science-based advice to policy-makers and citizens. Founded in 1652 as a learned society, it gathers today around 1,600 excellent members from over 30 countries. Since 2015, Leopoldina is engaged in various forms of science diplomacy, notably in the "science for diplomacy" dimension of SD, i.e. "using science cooperation to improve international relations between countries".[1] This comes into play for instance in Leopoldina's relations with the Western Balkans, Russia and China, and in science-related human rights issues. Germany's (and the European Union's) political relations with Russia and China prove to be challenging these days. Nevertheless, the German scientific cooperation with both Russia and China is ongoing, even increasing. This confirms that science offers a space for cooperation beyond politics, keeping communication channels open which otherwise would be lost. Joint scientific work functions not only on bilateral level, but also in multilateral settings, such as the G7 and G20 science-based advice[2]. This is a key activity of the Leopoldina, focusing on setting the global agenda on grand challenges ("science in diplomacy" dimension of SD). Leopoldina is active in human rights issues as well: its Human Rights Committee directs pledges for the respect of human rights of threatened scientists to political leaders. Such cases are identified together with the International Human Rights Network of Academies and Scholarly Societies.

Leopoldina engages its members and other scientists in SD activities, also working with other research organisations from Germany and worldwide, and creating synergies with additional initiatives. As the institutional support is relevant for the effectiveness of SD, Leopoldina cooperates with the German Federal Government. Here, two aspects are fundamental: (i) the organisational independence of science based on the

*Corresponding author:
Dr Marina Koch-Krumrei
Head of International Relations Department
German National Academy of Sciences Leopoldina
marina.koch-krumrei@leopoldina.org

DOI-Nr.: 10.26125/rn5n-y157

[1] UK's Royal Society and US' AAAS identify in their 2010 publication New Frontiers in Science Diplomacy. Navigating the Changing Balance of Power three dimensions of policy in which the "still fluid concept" of SD can be applied: (1) informing foreign policy objectives with scientific advice (science in diplomacy); (2) facilitating international science cooperation (diplomacy for science); (3) using science cooperation to improve international relations between countries (science for diplomacy). [Retrieved: 11.11.2021]

[2] Learn more about Leopoldina's G7 and G20 activities. [Retrieved: 11.11.2021]

"freedom of science" principle from Germany's Fundamental Law and (ii) the win-win-oriented working relationship. Trust, predictability, reactive capacity and weighing of options add quality to such interactions.

A practical example: the Berlin Process for the Western Balkans

A prominent example of science diplomacy by the Leopoldina is the Western Balkans Process (also known as the Berlin Process).

Genesis

Initiated mid-2014 by the German Chancellor Angela Merkel, this is a joint undertaking of 10 European Union (EU) Member States[3], six Western Balkan states (WB6)[4] and the European Commission to support the EU-integration of the WB6 and to foster regional cooperation in South East Europe. Conflicts and divides from the collapse of former Yugoslavia and of the communist system corroborated with many other problems still mark this area. That is why the key approach of the Berlin Process is that of connecting different fields of action to support profound transformation: from resolution of bilateral disputes to rule of law and economic development to rapprochement and cooperation in education and science.

Leopoldina has been entrusted by the German Federal Government to take the lead in the field of science, education and society within the Berlin Process, seeing this also as a German SD pilot project. Subsequently, Leopoldina has established in 2015 a platform for key national stakeholders of the education and science systems – the so-called Berlin Process Joint Science Conference (BPJSC). Its primary aim was/is to create a neutral forum on level playing field for dialogue, cooperation and joint approaches on science and education matters.

Modus operandi

The work of the Berlin Process is organised in different chapters corresponding to the fields of action in form of permanent conferences (broader involvement, also of non-political actors) or ministerial working groups. All chapters reassemble under a political umbrella with a yearly rotating presidency. The annual conferences of the chapters and the Summit of Heads of State and Government (Leaders Summit) are the pivotal elements of the process's workflow. Every chapter puts forward recommendations for the Leaders Summit. Leaders may adopt, endorse, change or decline the recommendations.

In operative terms, the work within the BPJSC unites *grosso modo* three streams: (i) an ongoing reflection on the topics chosen as priorities, including identifying experts, (ii) preparation of the annual meetings, including negotiating a Joint Statement adopted by consensus, and (iii) communication with involved actors, mainly the European Commission services and the OECD. Around 50-80 participants are involved yearly (including third-party experts and diplomats).

Results

The BPJSC[5] commenced in July 2015 as a "science for diplomacy" project with a first annual meeting in Berlin. Five additional meetings took place: 2016 in Vienna, 2017 in Paris, 2018 in Rome, 2019 in London and 2021 as a virtual meeting. At the first meeting, participants decided to widen the focus by adding the "policy for science"[6] dimension to BPJSC. In consequence, the meetings also examined necessary improvements for the WB6 science systems. In 2018, the "science for policy"[7] dimension was added as well, with two topics addressed since: in 2018, the WB6 economic convergence with the EU single market and in 2021, the COVID-19 pandemic. The major topic discussed in all meetings was the "brain drain" from South East Europe. For tackling this problematic phenomenon, participants have put forward concrete action proposals for "brain circulation" within Europe.

So far, political leaders have endorsed all Joint Statements produced by the BPJSC. The interplay between scientists, politicians and technical experts remains challenging. Nevertheless, convergency between different background actors is progressing. An increasing number of aspects is being addressed on national level and by the European Commission. Regrettably, the "brain drain" issue remains largely untouched.

Next future for science diplomacy: an outlook attempt

As shown in the case above, one question on the science diplomacy concept arises: is there a difference between SD and scientific advice in international affairs? There is no sharp distinction between the two: they are different forms of science-politics interaction which sometimes – yet not always – intermix, depending on the quality of the international relations and the topical focus in a given context. In an increasingly interdependent world, scientific knowledge will need to translate even more into international affairs and foreign policy according to the theorem "good governance needs good advice". COVID-19 is just a recent demonstration of that. Science diplomacy *can* step in at the intersection of science and foreign policy. However: with the limits of SD being influenced by the will of citizens and politicians, the concept itself will remain fuzzy in the next future. What counts in the end is the result: translating scientific expertise into good decisions for a better world.

[3] Austria, Bulgaria, Croatia, France, Germany, Greece, Italy, Poland, Slovenia and the United Kingdom (EU Member State until 31 January 2020).

[4] Albania, Bosnia and Herzegovina, Kosovo, Montenegro, North Macedonia and Serbia.

[5] Learn more about the Berlin Process Joint Science Conference. [Retrieved: 11.11.2021]

[6] Policy for science: providing scientific expertise and recommendations for the design of the policy on education, R&I policy of a country/region/community.

[7] Science for policy: providing scientific expertise for policy choices for the broader benefit of a country/region/community.

Dr Marina Koch-Krumrei

© David Ausserhofer

Dr Marina Koch-Krumrei heads the Department of International Relations at the German National Academy of Sciences Leopoldina since 2011. There, she has set up Leopoldina's international activities, amongst others, coordinating the input for the annual G7 and G20 scientific policy advice and supervising the National Academy's international portfolio. Before, she has gained extensive experience as science manager, heading the Washington Office and Berlin Office of the German Research Foundation (DFG); she has set up the latter in 2003. Marina received a PhD in Law from Ludwig-Maximilian-University Munich in 1991. Her thesis dealt with copyright protection of scientific publications in Germany and France.

Lucian Brujan

© University of Novi Sad

Lucian Brujan is Senior Scientific Officer at the Department of International Relations at the German National Academy of Sciences Leopoldina. Since 2015, he has also been leading the secretariat of the Berlin Process Joint Science Conference, a multilateral science diplomacy programme. Lucian has over 15 years of experience in international cooperation, science diplomacy, R&I policy and university management. He has worked at the University of Tübingen as Director of International Affairs and Communication. He graduated in Geography and German Studies, studying at the Western University of Timişoara and University of Tübingen.

Hot paper

Storing energy with molecular photoisomers

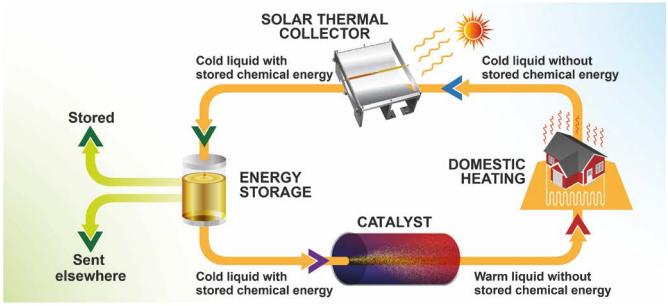


Image: Chalmers University of Technology

To comply with the worldwide increasing demand for renewable energy, new tailor-made concepts are required to capture and store solar energy for different applications and at different scale. Beside the well-established approaches for energy storage, such as batteries or power-to-X, smart molecular concepts may provide simple, small-scale solutions with the potential to complement the portfolio of established technologies for specific applications.

A particular promising concept is the so-called **'molecular solar thermal system' (MOST)**. MOST technology **combines solar energy conversion, energy storage, and energy release** in a simple molecular approach. The idea is **based on molecular photoswitches**, which are converted photochemically to a metastable high-energy state, and thus store solar energy in a simple one-molecule-one-photon process. The **stored energy** can later be **released on demand in form of heat**.

In a current review article, **eight leading research groups in the field from six countries** provide an insight into the current state-of-the-art of this exciting research field. [1] The article discusses the scientific concepts behind MOST, new ideas for molecular design, the incorporation into functional devices, and the challenges that remain for future research.

[1] Z. Wang, P. Erhart, T. Li, Z.-Y. Thang, D. Sampedro, Z. Hu, H. A. Wegner, O. Brummel, J. Libuda, M. B. Nielsen and K. Moth-Poulsen, *Joule*, 2021, DOI: https://doi.org/10.1016/j.joule.2021.11.001.

Contacts: **Dr. Olaf Brummel** (olaf.brummel@fau.de);
Prof. Dr. Jörg Libuda (joerg.libuda@fau.de)

Deutsche Bunsen-Gesellschaft
für physikalische Chemie

JUSTUS-LIEBIG-
UNIVERSITÄT
GIESSEN

Bunsen-Tagung 2022

121th General Assembly of the German Bunsen Society for Physical Chemistry

Understanding Dispersion Interactions in Molecular Chemistry

September 7-9, 2022, Giessen

INVITATION

We cordially invite you to the Bunsen-Tagung 2022 in Giessen! Giessen is a vibrant city in the heart of Germany – with the highest "density" of students among German university towns and therefore also one of the liveliest cities in Germany. Justus Liebig University is more than 400 years old, and it is one of the birthplaces of modern chemistry – with the original Liebig laboratory (now the Liebig Museum) as one of the major sites from the history of chemistry. Only a few years ago, the chemistry department has moved to one of the most modern chemistry buildings in Europe.

The 121th Bunsen-Tagung focuses on *dispersion interactions* and their multifold manifestations in chemistry. Dispersion is the driving force for molecular aggregation that plays a key role in the thermodynamic stability of (meta)stable structures, molecular recognition, chemical selectivity through transition-state stabilization, protein folding, enzyme catalysis, and many more. Despite the pioneering work of London and others in the 1930s, our understanding of dispersion interactions has only recently become much better. The aim of the Bunsen-Tagung is therefore to highlight the progress in a rapidly developing field encompassing both experiment and theory.

Parallel sessions will be run to present the most recent results from all other fields of physical chemistry – from gas phase chemistry to the solid state, from thermodynamics to quantum chemistry, from electrochemical studies to high resolution spectroscopy. We are convinced that you will enjoy the open atmosphere of the conference and the wide scope of subjects from fundamental to applied physical chemistry.

Foto: Marcus Rohnke

We are excited to host "in presence" the Bunsen-Tagung 2022 for the first time in many years not at the traditional "Himmelfahrt" holiday, and we are dedicated to make this vividly debated move a success. We hope that you will also feel invited to contribute to the scientific success, either by presenting your own work or by learning from others!

We are looking forward to welcoming you in Giessen,
Jürgen Janek, Peter R. Schreiner,
and Martin Suhm
Chairs of the Bunsen-Tagung 2022

www.bunsentagung.de

Deutsche Bunsen-Gesellschaft
für physikalische Chemie

JUSTUS-LIEBIG-
UNIVERSITÄT
GIESSEN

Bunsen-Tagung 2022

121th General Assembly of the German Bunsen Society for Physical Chemistry

Understanding Dispersion Interactions in Molecular Chemistry

September 7-9, 2022, Giessen

CALL FOR ABSTRACTS

As every year - we invite you to submit your contributions either to the main topic or to the general topics of Physical Chemistry. Submissions of contributions covering fundamental or applied, experimental or theoretical work (and combinations) are equally appreciated.

Main Topic

- Understanding Dispersion Interactions in Molecular Chemistry

General Topics of Physical Chemistry (all states of matter!)

- Biophysical Chemistry and Biophotonics
- Catalysis
- Electrochemistry
- Reaction Kinetics and Dynamics
- Spectroscopy
- Thermodynamics
- Theory and Data Science
- Transport and Storage

Abstract submission is accessible via **www.bunsentagung.de**

Start: January 20, 2022
Submissions for the main topic should be in English. Submissions to the other topics might be in English or German. The authors are expected to present their work in the language of the submitted abstract. A template and further requirements are available at the website.

Deadline for oral presentations and posters: **March 1, 2022**

Deadline for last minute posters: **June 30, 2022**

Abstracts submitted after these deadlines will not be reviewed.

Deutsche Bunsen-Gesellschaft
für physikalische Chemie

JUSTUS-LIEBIG-
UNIVERSITÄT
GIESSEN

Bunsen-Tagung 2022

121th General Assembly of the German Bunsen Society for Physical Chemistry

Understanding Dispersion Interactions in Molecular Chemistry

September 7-9, 2022, Giessen

PROGRAM OVERVIEW

WEDNESDAY, SEPTEMBER 7, 2022

- Opening Ceremony and Lecture
- Award Ceremony
- Welcome Dinner

THURSDAY, SEPTEMBER 8, 2022

- Scientific Program
- Industrial Exhibition
- Poster Session

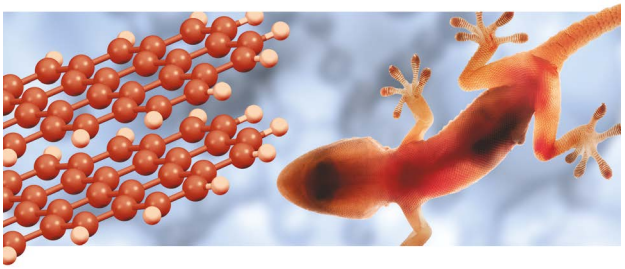
FRIDAY, SEPTEMBER 9, 2022

- Scientific Program
- Industrial Exhibition
- yPC Forum
- Award and Closing Ceremony

Foto: Felicitas Deck

PLENARY SPEAKERS

Stefan Grimme, University of Bonn
Scott Cockroft, University of Edinburgh
Philip P. Power, University of California, Davis
Melanie Schnell, DESY, Hamburg & Christian-Albrechts-University Kiel



KEYNOTE SPEAKERS

The keynote speakers will be chosen after review of the submitted abstracts. Potential candidates will be asked whether they are willing to hold a keynote lecture on their topic.

yPC-FORUM

The yPC-Forum is an annual event organized by the young Physical Chemists (yPC) of the DBG. It aims at scientists in earlier stages of their careers. It provides information and discussion on career related issues or hot topics in science.

www.bunsentagung.de

Deutsche Bunsen-Gesellschaft
für physikalische Chemie

JUSTUS-LIEBIG-
UNIVERSITÄT
GIESSEN

Bunsen-Tagung 2022

121th General Assembly of the German Bunsen Society for Physical Chemistry

Understanding Dispersion Interactions in Molecular Chemistry

September 7-9, 2022, Giessen

INFORMATION

EXHIBITION & SPONSORING

Companies are invited to participate at the accompanying exhibition. The exhibition presents a perfect opportunity to inform participants about your products and services as well as for networking. Furthermore various sponsoring opportunities are available to support the Bunsen-Tagung and we are open to discuss individual sponsoring packages. You can also support the conference via a direct donation to the German Bunsen Society.

Contact for additional information:
Dr. Marcus Rohnke, +49 (0)641 / 99 34502, marcus.rohnke@pc.jlug.de

STUDENT TRAVEL GRANTS

DBG provides financial support for the participation of students at the conference. PhD students are not eligible. Further information is available on www.bunsentagung.de

Deadline March 1, 2022

ORGANIZER
Deutsche Bunsen-Gesellschaft für physikalische Chemie e.V.
Varrentrappstr. 40-42
60486 Frankfurt am Main/Germany
+49 (0)69 7917-363
geschaeftsstelle@bunsen.de
www.bunsen.de

CONGRESS OFFICE
Gesellschaft Deutscher Chemiker e.V.
Lea Miskovsky
Varrentrappstr. 40-42
60486 Frankfurt am Main/Germany
+49 (0)69 7917-364
l.miskovsky@gdch.de

Die Deutsche Bunsen-Gesellschaft für physikalische Chemie gratuliert ihrem Mitglied Katharina Kohse-Höinghaus zum 70. Geburtstag

Katharina Kohse-Höinghaus darf man zu Recht als die „Grande Dame of Combustion Science“ bezeichnen. Wie kaum sonst jemand hat sie in den vergangenen Jahrzehnten dieses Forschungsgebiet international mitgestaltet und schon früh den Handlungsbedarf für eine klimabewusste Energiewandlung aufgezeigt. Sie hat es geschafft, Menschen für das Thema „Chemie“ zu begeistern und zu mobilisieren.

Nach ihrer Promotion 1978 in der Physikalischen-Chemie an der Ruhr-Universität Bochum setzte Katharina Kohse-Höinghaus ihre wissenschaftliche Laufbahn beim Deutschen Zentrum für Luft- und Raumfahrt in Stuttgart fort. Mit ihrer Habilitation 1992 bei Jürgen Warnatz über laserspektroskopische Verfahren in Verbrennungssystemen begann ein neuer Lebensabschnitt für sie, der sie an die Universität Bielefeld führte, wo sie 1994 Professorin für Physikalische Chemie wurde und seit 2017 als Senior-Professorin aktiv ist.

Sie hat in ihren Forschungsschwerpunkten Laser- und Massenspektroskopie, reagierende chemische Systeme, Verbrennungschemie, Schadstoffbildung und Materialsynthese bahnbrechende Arbeit geleistet und leistet sie nach wie vor. Sie hat hochrangige wissenschaftliche Konferenzen geleitet und gestaltet, wie beispielsweise die Gordon Research Conference on Laser Diagnostics in Combustion, das International Symposium on Combustion und viele mehr. Durch ihre federführenden Funktionen in wissenschaftlichen Gremien und Gesellschaften wie der Deutschen Forschungsgemeinschaft oder dem International Combustion Institute hat sie die Forschungsrichtung mitbestimmt und Forschungspolitik gestaltet. Unvergessen die Zeit, in der sie von 2007 bis 2008 Präsidentin der Deutschen Bunsen-Gesellschaft für physikalische Chemie war und 2009 bis 2010 das Amt der Vizepräsidentin verkörpert hat.

Über ihr fachliches Engagement hinaus hat Katharina Kohse-Höinghaus die Wissenschaftslandschaft in Deutschland entscheidend mitgestaltet und geprägt, sei es als Mitglied im Senat der Hermann von Helmholtz-Gemeinschaft Deutscher Forschungszentren, der Alexander von Humboldt-Stiftung, des Kuratoriums der Volkswagen-Stiftung und insbesondere als Mitglied des Wissenschaftsrats (2012 bis 2018). Sie kann einflussreiche Persönlichkeiten mit scharfsinnigen Argumenten überzeugen, ebenso wie sie junge Wissenschaftler und Wissenschaftlerinnen begeistern kann, und verliert dabei nie ihre liebenswürdige Art. Sie hat das Teutolab in Bielefeld, ein Mitmachlabor für junge Menschen, ins Leben gerufen und ist dafür vom damaligen Bundespräsidenten Horst Köhler mit dem Bundesverdienstkreuz am Bande ausgezeichnet worden.

Katharina Kohse-Höinghaus genießt in der internationalen Fachwelt höchste Anerkennung. Ihre überragende internationale Wertschätzung kulminierte schon früh in der Berufung an die University of Princeton, die sie jedoch nach reiflicher Überlegung zu Gunsten der deutschen Forschungslandschaft nicht annahm. Die vollständige Liste ihrer fachlichen Auszeichnungen würde diesen Rahmen sprengen, deshalb sei hier nur eine kleine Auswahl genannt: die Walther-Nernst-Denkmünze der Deutschen Bunsen-Gesellschaft; die Alfred C. Egerton-Goldmedaille des Combustion Institutes; die verliehene Mitgliedschaft in der European Academy of Sciences; Verleihung der Ehren-Gastprofessur der University of Science and Technology of China, Hefei; Ernennung zur Ehrensenatorin der Universität Bielefeld; Berufung zum Mitglied der Nationalen Akademie der Wissenschaften Leopoldina. Ihre ehemaligen Wegbegleiter*innen, ihre Fachkolleg*innen und Freunde weltweit und die Deutsche Bunsen-Gesellschaft für physikalische Chemie wünschen Katharina Kohse-Höinghaus weiterhin Schaffenskraft, Erfolg und Freude am Forschen.

Anke Kaysser-Pyzalla

Auszeichnungen und Ehrungen

Jörg Kerger, Prof. Dr., Universität Leipzig und Jürgen Caro, Prof. Dr., Leibniz Universität Hannover, wurden mit dem Eni Award in der Kategorie „Advanced Environmental Solutions“ ausgezeichnet.

Katharina Kohse-Höinghaus, Prof. Dr., Universität Bielefeld, wurde als Foreign Member in die Chinesische Akademie der Wissenschaften (CAS) gewählt. Außerdem wurde sie mit der Rudolph-Günther-Medaille ausgezeichnet.

Geburtstage im Februar 2022

Elke Diemer, Dipl.-Chem.

Markus Hugenschmidt, Dr.

Peter Schmich, Prof. Dr.

Martin Schottler, Dr.-Ing

Gabriele Roden, Dr.

Eberhard Heuser, Dr.-Ing.

Herbert Stafast, Prof. Dr.

Horst Ludwig, Prof. Dr.

Horst Förster, Prof. Dr. Dr. h.c.

Geburtstage im März 2022

Helmut Steger, Dr.

Jürgen Söllner, Dipl.-Chem.

Andreas Heintz, Prof. Dr.

Christoph Bräuchle, Prof. Dr.

Josef Friedrich, Prof. Dr.

Horst Gonska, Dr.

Peter Jörg Plath, Prof. Dr.

Günter Borchardt, Prof. Dr.-Ing

Das Bunsen-Magazin dokumentiert Geburtstage der DBG-Miglieder in Fünfjahresschritten – beginnend mit dem 60. Geburtstag. Mitglieder, die keine Veröffentlichung ihres Geburtstags wünschen, teilen dies bitte der DBG-Geschäftsstelle mit: geschaeftsstelle@bunsen.de

Neuanmeldungen zur Mitgliedschaft

Prof. Dr. Frank Ortmann

Verstorben

Edward William Schlag, Prof. Dr. Dr.E.h. im Alter von 89 Jahren

Veranstaltungen

Deutsche Bunsen-Gesellschaft

yPC meets Industry
Künstliche Intelligenz in der Pharmaforschung
9. Februar 2022, online
www.bunsen.de/ypc-events

International Bunsen Discussion Meeting
Benchmark Experiments for Numerical Quantum Chemistry
29.–31. März 2022, Göttingen
https://uni-goettingen.de/en/645339.html

Bunsen-Kolloquium
New Horizons in Solid State Ionics
28.–29. Juli 2022, Universität Aachen und online

Bunsen-Tagung 2022
Understanding Dispersion Interactions in Molecular Chemistry
7.–9. September 2022, Giessen
www.bunsentagung.de

Weitere Veranstaltungen

Chemiedozententagung 2022
21.–23. März 2022, Saarbrücken
www.gdch.de/cdt2022

JCF-Frühjahrssymposium 2022
Communicating the Future
23.–26. März 2022, Hannover (mit Beteiligung von yPC)
www.symposium.jcf.io

Ausschreibungen

Klung-Wilhelmy-Wissenschafts-Preis für Chemie 2022

Dieser Preis zeichnet jüngere deutsche Spitzenwissenschaftler:innen für originelle und richtungweisende Beiträge in der Chemie aus. Einsendeschluss:
1. Februar 2022
Details: www.klung-wilhelmy-wissenschafts-preis.de

Verschiedenes

Meilenstein zu breit nutzbaren Quantencomputern erreicht

Das internationale Wettrennen im Bereich Quantentechnologien ist in vollem Gange. Deutschland und die Europäische Union müssen zur Sicherstellung der technologischen Souveränität hier mit ganzer Kraft mithalten. Deshalb ist jetzt das vom BMBF mit 40,1 Millionen Euro geförderte Projekt „Quantencomputer-Erweiterung durch Exascale-HPC (Q-Exa)“ gestartet. Geführt vom deutsch-finnischen Start-up IQM wird der Forschungsverbund einen Quantencomputer auf der Basis von supraleitenden Schaltkreisen bereitstellen und in das Leibniz-Rechenzentrum (LRZ) der Bayerischen Akademie der Wissenschaften in Garching integrieren.
https://www.bmbf.de/bmbf/shareddocs/kurzmeldungen/de/2021/11/meilenstein-zu-breit-nutzbaren-quantencomputern.html

Wie gelingt die Kommunikation wissenschaftlichen Wissens?

Wissenschaftsrat analysiert Rahmenbedingungen und Entwicklungsbedarf der Wissenschaftskommunikation.
Kommunikative Herausforderungen im Verhältnis von Wissenschaft und Politik, Öffentlichkeit und Medien sind in der COVID-19-Pandemie besonders sichtbar geworden, entstanden aber nicht erst in der Ausnahmesituation. Die Wissenschaft ist mit vielen gesellschaftlichen Problemstellungen eng verflochten, so dass sich in der Wissenschaftskommunikation insgesamt neue Anforderungen stellen. In seinem jetzt vorgelegten Positionspapier nimmt der Wissenschaftsrat diesen Themenkomplex in den Blick und analysiert die Anforderungen an die individuelle und die institutionelle Wissenschaftskommunikation.
https://www.wissenschaftsrat.de/download/2021/9367-21.pdf

DPG-Positionspapier „Zukunft des wissenschaftlichen Publikationssystems“

Das wissenschaftliche Publikationswesen befindet sich weltweit im Umbruch. Noch ist nicht klar, wohin die Reise geht. Aus Sicht praktizierender Wissenschaftlerinnen und Wissenschaftler bezieht die Deutsche Physikalische Gesellschaft (DPG) Stellung zu den Rahmenbedingungen für ein wissenschaftliches Publika-

tionswesen, um den Anliegen ihrer Mitglieder Gehör zu verschaffen. Kurz und bündig werden zentrale Themengebiete behandelt: die allgemeine Zugänglichkeit, die Kosten- und Datentransparenz im Publikationswesen, das Absenken der Eintrittsschwelle für Innovationen und neue Marktteilnehmer sowie die Rolle der wissenschaftlichen Gemeinschaft bei der Zukunftsgestaltung.
https://www.dpg-physik.de/veroeffentlichungen/publikationen/stellungnahmen-der-dpg/wissenschaftssystem/dpg-positionspapier-zur-zukunft-des-wissenschaftlichen-publikationswesens

Deutsche Bunsen-Gesellschaft für physikalische Chemie

*y*PC Meets Industry online

young PHYSICAL CHEMISTS

09.02.2022, 16 Uhr
Künstliche Intelligenz in der Pharmaforschung

Dr. Jan Kriegl
Global Computational Biology and Digital Sciences
Boehringer Ingelheim Pharma GmbH & Co. KG

Dr. Jörg Weiser
Managing Director, Schrödinger GmbH

Anmeldung auf www.bunsen.de/ypc-events

Deutsche Bunsen-Gesellschaft für physikalische Chemie

Ewald-Wicke-Prize 2022

The German Bunsen Society for Physical Chemistry (Deutsche Bunsen-Gesellschaft für physikalische Chemie e.V.) and the Ewald-Wicke-Foundation seek nominations of candidates for the Ewald-Wicke-Prize 2022 dedicated to the memory of Ewald Wicke.

The prize will be awarded to a distinguished junior scientist (up to 35 years of age) for outstanding scientific achievements in the area of applied physical chemistry. Suitable candidates should have a completed doctorate and further recognizable achievements in applied physical chemistry. The candidates will be evaluated with respect to the scientific quality and originality of their research. Nominees should come from a German-speaking region in Europe or work there at the time of their nomination.

The award ceremony will take place at the opening event of the Bunsen-Tagung 2022 in Giessen. Nominations for the Ewald-Wicke-Prize should be submitted as follows:

- a concise supporting statement which shows the candidate's scientific achievements and states the corresponding publications
- a CV of the candidate

Self-nominations are not eligible.

Nominations should be submitted by **28th February 2022** to

Deutsche Bunsen-Gesellschaft für physikalische Chemie e. V., Dr. Elisabeth Kapatsina, geschaeftsstelle@bunsen.de

Deutsche Bunsen-Gesellschaft
für physikalische Chemie

Nernst-Haber-Bodenstein-Prize 2022

The German Bunsen Society for Physical Chemistry (Deutsche Bunsen-Gesellschaft für physikalische Chemie e.V.) seeks nominations of candidates for the Nernst-Haber-Bodenstein Prize 2022 dedicated to the memory of Max Bodenstein, Fritz Haber and Walther Nernst. The prize will be awarded to a distinguished junior scientist (up to 40 years of age and without a permanent professorship at the time of nomination) for outstanding scientific achievements in the physical chemistry. Suitable candidates of international visibility in their research field will be evaluated with respect to the scientific quality, originality and independence of their research. Candidates should come from a German-speaking region of Europe or work there at the time of their nomination.

The award ceremony will take place at the opening event of the Bunsen-Tagung 2022 in Giessen.

Nominations for the Nernst-Haber-Bodenstein-Prize should be submitted as follows:

- a concise supporting statement which shows the candidate's scientific achievements and states the corresponding publications
- a CV of the candidate

Self-nominations are not eligible.

Nominations should be submitted by **28th February 2022** to

Deutsche Bunsen-Gesellschaft für physikalische Chemie e. V., Dr. Elisabeth Kapatsina, geschaeftsstelle@bunsen.de

Deutsche Bunsen-Gesellschaft
für physikalische Chemie

van 't Hoff-Prize 2022

The van 't Hoff Prize was established in 2008 by Gerhard Ertl in remembrance of the first Nobel Prize winner in chemistry Jacobus Henricus van 't Hoff. The award consists of a silver medal, a certificate and an amount of prize money. The award ceremony will take place at the opening event of the Bunsen-Tagung 2022 in Giessen.

The prize is awarded for outstanding and sustained contributions to the field of Physical Chemistry by an active, mid-career scientist, not older than 55 years of age. Suitable candidates of high international visibility in their research field will be evaluated with respect to scientific quality of their research. There are no restrictions on age, nationality or country of residence, but candidates should preferentially come from a German-speaking region in Europe.

Nominations for the van 't Hoff-Prize should be submitted as follows:

- a concise supporting statement which shows the candidate's scientific achievements and states the corresponding publications
- a CV of the candidate

Self-nominations are not eligible.

Nominations should be submitted by **28th February 2022** to

Deutsche Bunsen-Gesellschaft für physikalische Chemie e. V., Dr. Elisabeth Kapatsina, geschaeftsstelle@bunsen.de

Deutsche Bunsen-Gesellschaft
für physikalische Chemie

Die Deutsche Bunsen-Gesellschaft für physikalische Chemie e.V. vergibt im Jahr 2022 den

Agnes-Pockels-Promotionspreis

im Andenken an Agnes Pockels und zur Förderung junger Wissenschaftler:innen auf dem Gebiet der Physikalischen Chemie.

Aus den schriftlichen Eigenbewerbungen wählt das DBG-Preiskomitee vier Kandidat:innen, die auf der Bunsen-Tagung ihre Arbeit mit einem Vortrag vorstellen. Der/Die Preisträger:in wird anschließend durch das DBG-Preiskomitee bestimmt und der Preis im Rahmen der Abschlussveranstaltung verliehen.

Der Preis wird an Promovierende ab dem dritten Promotionsjahr und an Promovierte bis ein Jahr nach der Promotion vergeben, die eine herausragende Arbeit im Bereich der physikalischen Chemie nachweisen können. Er ist mit 1.000 € dotiert. Geeignete Kandidat:innen werden in Bezug auf die wissenschaftliche Qualität und Originalität ihrer Arbeit beurteilt. Die Kandidat:innen sollten aus einer Region in Europa kommen oder dort zum Zeitpunkt der Bewerbung arbeiten.

Bewerbungen für den Agnes-Pockels-Promotionspreis sollen in folgender Form eingereicht werden:
- Zusammenfassung der auszuzeichnenden Arbeit (Eigenbewerbung, max. 2 Seiten)
- Zwei Empfehlungsschreiben von erfahrenen Wissenschaftler:innen (z. B. durch Betreuer:in der Promotion) mit prägnanter Begründung für die Preiswürdigkeit (jeweils max. 2 Seiten)
- Lebenslauf des/der Kandidat:in (max. 2 Seiten)

Die Unterlagen können in deutscher oder englischer Sprache eingereicht werden. Bitte richten Sie Ihre Bewerbung bis zum **28. Februar 2022** an die Deutsche Bunsen-Gesellschaft für physikalische Chemie e.V., Dr. Elisabeth Kapatsina, geschaeftsstelle@bunsen.de

Meyer-Galow-Preis: Membranpolymere für emissionsarme Biogasaufbereitung

Polymere sind wahre Alleskönner und aus unserem Alltag nicht mehr wegzudenken. Mit ihren variablen Eigenschaften sind sie fast überall einsetzbar. Zwar verursachen sie durch ihre lange Haltbarkeit auch Umweltprobleme, so dass das Recycling von Polymermaterialien zurzeit intensiv erforscht wird. Aber durch ihre für verschiedene Anwendungen maßgeschneiderten Eigenschaften spielen Polymere bei der nachhaltigen Energieerzeugung und -speicherung eine wichtige Rolle.

Aber auch in der Biogasaufbereitung kann der Einsatz von Polymeren für die Verringerung von Emissionen eingesetzt werden. Ein Team des Essener Spezialchemiekonzerns Evonik entwickelte neuartige Membranmodule aus Polyimid, die eine emissionsarme Biogasaufbereitung ermöglichen, und führte sie erfolgreich im Markt ein. Dafür erhalten Dr. Goetz Baumgarten, Dr. Jörg Balster und Dr. Axel Kobus von der Gesellschaft Deutscher Chemiker (GDCh) den mit 10 000 Euro dotierten Meyer-Galow-Preis für Wirtschaftschemie 2021.

Polyimide sind Hochleistungskunststoffe, die sehr druck- und temperaturbeständig sind und außerdem sehr gut versponnen werden können. Daher eignen sie sich besonders für den Einsatz in so genannten Hohlfasermembranen, die beispielsweise in der Gasaufbereitungstechnologie zum Einsatz kommen. Bei Evonik gelang es, die Eigenschaften der eigenen Polyimid-Familie so maßzuschneidern und weiterzuentwickeln, dass mit Hilfe der daraus gesponnenen Hohlfasermembranen Membranmodule mit besonderen Gastrenneigenschaften geschaffen werden konnten. Mit Unterstützung der hausinternen Membranprozesstechnologie und zugehöriger verfahrenstechnischer Infrastruktur wurde daraus eine innovative Systemlösung für Gastrennaufgaben geschaffen.

Die Preisträger haben maßgeblich dazu beigetragen, innerhalb von nur zehn Jahren unter dem Markennamen SEPURAN® einen technologisch führenden Anbieter für effiziente und langlebige Gastrennmembranen aufzubauen. Dafür stellten sie ein hochmotiviertes und unternehmerisch agierendes Team aus internen und externen Fachleuten auf, mit dem anfängliche Technologielücken geschlossen werden konnten.

Eine ab dem Jahr 2011 eigens für den neu entstehenden Biogasmarkt entwickelte membranbasierte Gasaufbereitungstechnologie für Rohbiogas zu Biomethan konnte sich sowohl gegen Wettbewerbsverfahren wie auch gegen alternative Membranlösungen durchsetzen. Mit weltweit mehr als 300 Anlagen ist sie heute die führende Biogasaufbereitungstechnologie. Untersuchungen zeigen, dass sich bei auf diesem Wege produziertem Biomethan die Emissionen gegenüber Erdgas um rund 90 Prozent reduzieren lassen. Damit haben die Preisträger einen wertvollen Beitrag dazu geleistet, den nachwachsenden Rohstoff Biomethan einfach, robust und besonders energieeffizient zur Verfügung zu stellen und Folgeanwendungen zu ermöglichen. Seit 2015 entwickelt das Team die Produktpalette mit neuen Membran- und Modultypen so weiter, dass der gesamte Gasmarkt bedient werden kann.

Mit dem Meyer-Galow-Preis für Wirtschaftschemie werden jährlich Wissenschaftlerinnen und Wissenschaftler im deutschsprachigen Raum ausgezeichnet, die eine aktuelle Innovation der Chemie erfolgreich in den Markt eingeführt haben. Im Fokus stehen dabei Markteinführungen, die vorrangig den Gesichtspunkt der Nachhaltigkeit berücksichtigen. Der Preis wurde von Professor Dr. Erhard Meyer-Galow gestiftet, dem ehemaligen Vorstandsvorsitzenden der Hüls AG und früheren Präsidenten der GDCh.

Dr. Goetz Baumgarten
(Foto: privat)

Dr. Jörg Balster
(Foto: privat)

Dr. Axel Kobus
(Foto: privat)

Nachruf

Prof. Dr. Wolf Vielstich

18.06.1923 – 27.08.2021

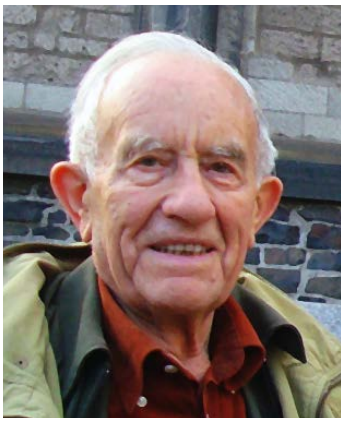


Bild: Iwasita-Vielstich

Notre recherche ne peut pas s'arrêter. Notre objectif est dans l'autre monde. (Michel de Montaigne)

Am 27. August 2021 ist das lange und reiche Leben eines Forschers, der in gleichem Maß als Lehrer und als Wissenschaftler Vorbild war und ist, friedlich zu Ende gegangen.

Es begann – und dies bezeichnet einen Lebensweg, der wichtige Epochen und Einschnitte des letzten, 20. Jahrhunderts umschließt – am 18. Juni 1923 in München. Aus dem Krieg, an dem er als Pilot teilnahm, zurückgekehrt nahm er das Studium der Physik an der Universität Göttingen auf. Er schloss es mit einer von K.F. Bonhoeffer am Max Planck Institut für Physikalische Chemie betreuten Diplomarbeit zu Grenzschichten an Elektroden ab, seine Dissertation (1953) zur Kinetik von Elektrodenprozessen wurde von H. Gerischer ebenfalls an diesem Institut betreut. Neben Messungen mit Radioisotopen – deren Deutung zum Verständnis der Austauschströme an der Phasengrenze Elektrode/Elektrolytlösung sicher noch immer zum überaus einleuchtenden Bestandteil elektrochemischer Vorlesungen gehört – brauchte es für die schnelle Kinetik u.a. der Silberelektrode einen leistungsfähigen Potentiostaten. Mit Hans Wenking verfeinerte er dieses für die Elektrochemie essentielle Gerät. Beim späteren Postdoc-Aufenthalt bei Paul Delahay an der Lousiana State University (1955/56) war ein schneller Potentiostat für die Entwicklung einer schnellen Potentialsprungmethode wiederum essentiell. 1958 begann er als Mitarbeiter von M. von Stackelberg seinen Weg in der Rheinischen Friedrich-Wilhelms-Universität. Die Einladung von W. von Braun 1960 zur Mitwirkung im Apollo-Programm konnte ihn ebenso wenig wie andere ehrenvolle internationale Angebote vom weiteren akademischen Werdegang in Bonn abhalten. 1962 schloss er seine Habilitation mit einer Schrift über Brennstoffzellen ab. Diese erschien 1965 als Buch „Brennstoffelemente: moderne Verfahren zur elektrochemischen Energiegewinnung" bei VCH, Weinheim. Im gleichen Jahr wurde er zum Professor ernannt, von 1972 bis zu seiner Emeritierung 1988 war er Leiter des Instituts für Physikalische Chemie. Es folgten Tätigkeiten als Gastprofessor an der Universität der Bundeswehr in München, danach an der Universidade de Sao Paulo in Brasilien.

Als Lehrer hat er die Physikalische Chemie vertreten, dabei hat er die Elektrochemie in einem mutigen Experiment im Wintersemester 1973 Erstsemestern der Chemie in einer einsemestrigen Vorlesung nähergebracht. Bei vielen Hörer*innen hat er dabei einen bleibenden Eindruck hinterlassen – einige von ihnen sind dem Fach treu geblieben. Leider hat es keine Wiederholung gegeben, die Rolle der Elektrochemie in zunächst der Lehre an deutschen Hochschulen, dann auch in der Forschung, hat in den Folgejahren leider nicht die Bedeutung behalten, die ihr nicht nur nach seiner Meinung zukam. Die Breite dieser überaus interdisziplinären Forschungsrichtung kam dennoch in Vorlesungen für Studierende höherer Semester zum Tragen. Hier gab er nachdrücklich dem Nachwuchs in seinem stets großen Arbeitskreis Gelegenheit, erste Erfahrungen in selbständiger Vorbereitung und Durchführung einer Vorlesung zu sammeln. Für ihn war dies eine Selbstverständlichkeit, nicht etwa eine Großzügigkeit. Leider war es bereits seinerzeit eine Ausnahme, mittlerweile eine Seltenheit. Für ihn war es vollkommen typisch für seinen Stil in der Anleitung des wissenschaftlichen Nachwuchses: Selbständiges Arbeiten und hohe Eigenmotiva-

tion waren selbstverständliche Voraussetzungen. Die Gewissheit jederzeit gewährter Anregung und Unterstützung hat sicher vielen Mitarbeiter*innen die Entwicklung eines eigenen wissenschaftlichen Werdegangs erleichtert, manche werden diese Erfahrungen als Anregung für die eigene Tätigkeit im akademischen Umfeld mitgenommen haben.

Als Forscher ist er den Anregungen aus der Zeit in Göttingen treu geblieben. Elektrochemie, insbesondere die Brennstoffzelle, hat er zunächst bei der Ruhrchemie AG in Holten mit etabliert. Dort erhaltene Einblicke in die Fischer-Tropsch-Synthese haben eine viele Jahre aktive kleine Arbeitsgruppe im Bonner Institut angeregt. Elektrochemische Energieumwandlung wurde zum zentralen Thema, das in seiner gesamten Breite von grundsätzlichen Fragestellungen bis zu anwendungsnahen Aspekten bearbeitet wurde. Dazu gehörten auch praktische Beispiele: Eine Aluminium-Luft-Batterie wurde probeweise in ein batteriebetriebenes Fahrzeug eingebaut, dessen Probefahrt allerdings auf das Institutsgelände beschränkt blieb. Das erste europäische Forschungsprojekt zur Direktmethanolbrennstoffzelle koordinierte W. Vielstich von 1986 bis 1993.

Neben zahlreichen Beiträgen in Fachzeitschriften und Patenten hat W. Vielstich in Büchern bleibende Spuren hinterlassen: Viele Studierende haben mit dem in vier Auflagen erschienenen Buch „Elektrochemie“ gelernt, die englische Fassung erschien in zwei Auflagen, auch eine chinesische Fassung ist erschienen. Als Mitherausgeber hat er im „Handbook of fuel cells: fundamentals, technology, and applications“ (Wiley 2003) ein Standardwerk vorgelegt.

Neben der Wissenschaft blieb er drei Leidenschaften treu: Segelfliegen, Tischtennis und Skifahren. Er teilte sie ganz selbstverständlich mit seiner Arbeitsgruppe.

Rudolf Holze

(shou (chin.) Langlebigkeit)

Deutsche Bunsen-Gesellschaft
für physikalische Chemie

☎ +49 (0) 69-7917-363
✉ service@bunsen.de
Varrentrappstr. 40-42, 60486 Frankfurt

☐ ANTRAG AUF MITGLIEDSCHAFT ☐ ÄNDERUNGSMITTEILUNG Mitgliedsnummer: _____

in der **Deutschen Bunsen-Gesellschaft für physikalische Chemie e. V.** **Jahresbeitrag**

☐ persönliches, studentisches Mitglied[1,2] (Bunsen-Magazin nur online)	0,- €
☐ persönliches, studentisches Mitglied[1,2] (Bunsen-Magazin gedruckt)	30,- €
☐ persönliches Jungmitglied[2] (bis zu 3 Jahren nach Studienabschluss)	75,- €
☐ persönliches Doppelmitglied (Mitgliedschaft bei DECHEMA, DPG, GDCh oder GBM; Mitglieds-Nr.: _____)	90,- €
☐ persönliches, ordentliches Mitglied	120,- €
☐ nichtpersönliches Mitglied (Institute, Bibliotheken, Firmen usw.)	580,- €

in der **Deutschen Flüssigkristall-Gesellschaft (DFKG)**

☐ persönliches, studentisches Mitglied[1]	0,- €
☐ persönliches, ordentliches Mitglied	25,- €
☐ persönliches, ordentliches Mitglied (keine DBG-Mitgliedschaft)	40,- €
☐ institutionelle Mitglieder	150,- €

in der **AG Theoretische Chemie (AGTC)**

☐ persönliches, ordentliches Mitglied	13,- €

[1] **Studienbescheinigung erforderlich,** [2] **inkl. Mitgliedschaft bei der young Physical Chemists (yPC, Nachwuchsorganisation der DBG)**

Daten zur Person

Titel/Vorname/Name _____ Geburtsdatum _____
(TT/MM/JJJJ)

☐ **Privat** ☐ **Dienstlich**

Institution/ Firma

Adresszusatz

Straße

PLZ/Ort/Land

Telefonnummer E-Mail

Datenschutzhinweise / Einwilligungserklärung
Ihre personenbezogenen Daten werden von der Deutschen Bunsen-Gesellschaft (DBG) gemäß der europäischen Datenschutzgrundverordnung (DSGVO) und dem deutschen Datenschutzrecht (BDSG) für die Begründung und Verwaltung Ihrer Mitgliedschaft erhoben, verarbeitet und genutzt. Im Rahmen dieser Zweckbestimmungen werden Ihre Daten ausschließlich zur Erfüllung der satzungsgemäßen Aufgaben (https://bunsen.de/wir-ueber-uns/satzung) und der Mitgliederbetreuung an diesbezüglich besonders Beauftragte weitergegeben und genutzt. Sie können jederzeit Auskunft über Ihre personenbezogenen Daten erhalten, sowie die Berichtigung, Löschung oder Sperrung für die Zukunft vornehmen. Weitere Hinweise zum Datenschutz finden Sie unter https://bunsen.de/datenschutzerklaerung.

Ich willige ein, dass mein Geburtsdatum in die im Bunsen-Magazin veröffentlichte Geburtstagsliste aufgenommen wird.
☐ ja ☐ nein

Ich willige ein, dass mein Geburtsdatum und meine Adress- und Kommunikationsdaten in Onlinemitgliederverzeichnisse der Deutschen Bunsen-Gesellschaft für physikalische Chemie aufgenommen werden.
☐ ja ☐ nein

Hiermit ☐ erkläre ich meinen Beitritt zur DBG/ ☐ zeige ich Änderungen meiner Daten an[3] und nehme die Datenschutzhinweise sowie die Satzung zur Kenntnis.

Ort/Datum _____ **Unterschrift** _____

[3] zutreffendes bitte ankreuzen

Erteilung eines SEPA-Lastschriftmandats

Deutsche Bunsen-Gesellschaft für physikalische Chemie e.V.
Gläubiger-Identifikationsnummer: DE 15ZZZ00000522723
Mandatsreferenz = Mitgliedsnummer

Ich ermächtige die DBG meine Mitgliedsbeiträge zu Lasten des angegebenen Kontos einzuziehen. Zugleich weise ich mein Kreditinstitut an, die von der DBG auf mein Konto gezogenen Lastschriften einzulösen.

Hinweis: Ich kann innerhalb von acht Wochen, beginnend mit dem Belastungsdatum, die Erstattung des belasteten Betrages verlangen. Es gelten dabei die vom Kreditinstitut vereinbarten Bedingungen. Einen Wechsel oder Löschen des Kontos teile ich der DBG unverzüglich mit.

Titel/Vorname/Name

Straße und Hausnummer

PLZ/Ort

IBAN

Kreditinstitut

BIC

Ort/ Datum **Unterschrift**