

TALK BY PROF. KLAUS KÜMMERER ON “FROM GREEN CHEMISTRY TO CHEMISTRY IN A CIRCULAR ECONOMY TO SUSTAINABLE CHEMISTRY”

CC in cooperation with International Union of Pure and Applied Chemistry (IUPAC) organised a Talk by **Prof. Klaus Kümmeler** on “From Green Chemistry to Chemistry in a Circular Economy to Sustainable Chemistry” on 18 January 2021 from 6.30 p.m. to 8.30 p.m. Talk was attended by more than 120 delegates and was a great success.

Professor Christopher M.A. Brett, President, IUPAC was a **Chief Guest** and delivered the introductory Speech.

Both the speakers are highly respected and are well known in the industry.

Prof. Klaus Kümmeler is Director of the Institute of Sustainable and Environmental Chemistry and holds the chair of Sustainable Chemistry and Material Resources

at the public Leuphana University Lüneburg (Germany). He is Director Research and Education of the International Sustainable Chemistry Collaborative Centre (ISC3) in Bonn (Germany) too. His research and teaching is focused on Sustainable Chemistry, Sustainable Pharmacy, Material Resources, Aquatic Environmental Chemistry, and Time in Environmental and Sustainability Research. He received national and international awards for his interdisciplinary work. Klaus Kümmeler serves and served in national committees (e.g. German Research Council's Senate Commission for Water Research, Board of the Division of Sustainable Chemistry of German Chemical Society) and international ones including Global Chemical Outlook by UNEP, the

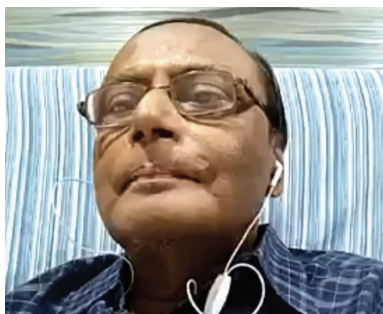
EU Technology Platform SusChem Europe and IUPAC Interdivisional Committee on Green Chemistry for Sustainable Development (ICGCSD). He is advising international organisations such as UNEP and WHO and companies. He is also scientific chair and co-organizer of the annual interdisciplinary Green and Sustainable Chemistry Conference and the annual Summer School on Sustainable Chemistry in International Cooperation. He is founding editor and editor-in-chief of Sustainable Chemistry and Pharmacy, and Current Opinion in Sustainable Chemistry journals as well as associate editor of Chemosphere and Environmental Pollution. He published extensively in international scientific peer reviewed journals and (co)edited more than 10 scientific books.



ADVANCING CHEMISTRY WORLDWIDE

IUPAC's unique role in the world chemistry community

- A focus on those aspects of chemistry where **global** consensus is essential for progress in research, commerce and policy.
- Respect for its objectivity and scientific excellence, providing access to the highest levels in the scientific, industrial, and policy communities to represent **global** chemistry.
- A **worldwide** base of volunteer scientists with the best skills and background, recruited by transparent and well-understood processes.
- Links with **international organisations**: UNESCO, OPCW, UNEP...
- **UN Sustainable Development Goals**



DR. B. SAHA

Prof. Klaus Kümmerer is very learned and expert on the subject "Sustainable Chemistry".

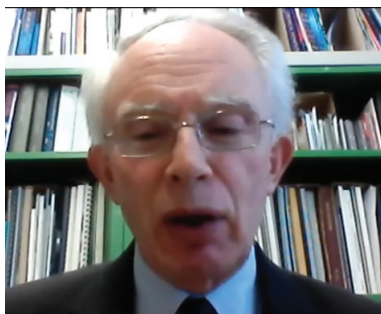
Professor Christopher Brett holds MA and DPhil degrees from the University of Oxford, UK.

Prior to his election as President, he was Vice President of IUPAC and Elected Member of the Bureau and Member of the Executive Committee of the Bureau (2012-2015; 2016-2019). He is a member of the Interdivisional Committee on Green Chemistry for Sustainable Development, having been on the Green Chemistry Sub-committee since its foundation in 2002.

His research interests lie in the broad area of materials and electrochemistry, sensing and biosensing on which he has published nearly 300 scientific papers. He is the co-author of a widely-known and successful textbook on electrochemistry for undergraduate and postgraduate students.

Professor Christopher Brett in his address highlighted IUPAC activities, how IUPAC functions and how it interacts with the Academia, Student world and the industry.

The Talk was possible because of **Dr. B. Saha**, IUPAC Bureau Member, & Secretary IUPAC Committee on Chemistry and Industry who gave Introductory Remarks during the Talk. Few months back, Dr. B. Saha, and his Colleagues Dr. Jean Pelin, Director General (Retired), U.I.C. (Union of Industries Chimiques), French Chemical Industry Trade and Employers' Association, Titular Member, IUPAC Committee on

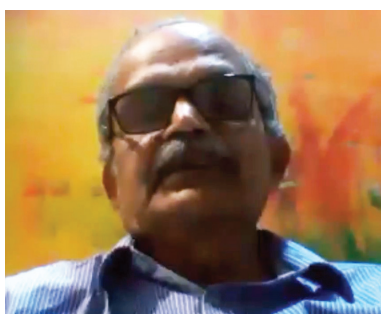


PROF. CHRISTOPHER BRETT

Chemistry and Industry, Professor Anna S. Makarova, UNESCO Chair, Green Chemistry for Sustainable Development, Mendeleyev University of Chemical Technology of Russia, Chair, IUPAC Committee on Chemistry and Industry and Professor Mary Garson, IUPAC Bureau Member and Co-Chair of Global Women's Breakfast (2019), School of Chemistry and Molecular Biosciences, The University of Queensland, Brisbane, Australia had interacted with members of Technology & Energy Expert Committee of ICC virtually for exploring areas of cooperation.

Mr. Sudhir Deo, Chairman, Technology & Energy Expert Committee, ICC delivered the Welcome Address and thanked Dr. B. Saha, for his cooperation and making this event happen. He also referred to the discussion ICC Technology & Energy Expert Committee Members had with the IUPAC Members. Some areas like Responsible Care, Safety, Health & Environment etc. are of concerns to both the organizations. He introduced speakers for the Talk and invited Dr. B. Saha to give his Introductory Remarks.

Dr. B. Saha in his address



MR. SUDHIR DEO

thanked ICC for arranging the Talk and referred to the discussion his team had with Technology & Energy Expert Committee Members of ICC. He also briefly outlined the activities of IUPAC and the work which is being done by the Indian Chapter of IUPAC. He said that Indian chemical industry was not playing an active role in IUPAC but now since 2018-19, industry has been participating in the IUPAC activities. He also referred to 4 nominations received for "IUPAC Distinguished Women in Chemistry or Chemical Engineering Award" with the help of ICC. He also referred to IUPAC Global Women's Breakfast 2021 which will be held on 9 February 2021. He also referred to the activities arranged by IUPAC India for celebration 150 years of Periodic Table and because of the



efforts made by IUPAC Student, Academia Community and industry for celebrating 150 years of Periodic Table, he was invited as a speaker on the International Celebration organised at Tokyo in 2019 and his presentation was appreciated by the delegates.



PROF. KLAUS KÜMMERER

Some of the salient features of Prof. Klaus Kümmerer's

presentation on "From Green Chemistry to Chemistry in a Circular Economy to Sustainable Chemistry" included:

- 350,000 chemicals globally marketed, plus Mixtures, Materials, and Complex Products
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- Hazardous to health 62 % of chemicals volume used in Europe 2016 (Source: European Environmental Agency)
- Ca. 1.6 mill. deaths in 2016 attributable to chemicals, many more affected (Source: World Health Organization)
- Neurological behavioural disorders caused by chemicals:

Costs >170 Bill. US \$ per year in EU (Source: UNEP Environment 2019)

- Several hundred synthetic chemicals present in humans (Source: UNEP Environment 2019)
 - The 12 principles of Green Chemistry:
 1. Prevent Waste
 2. Atom Economy
 3. Less Hazardous Synthesis
 4. Design Benign Chemicals
 5. Benign Solvents & Auxiliaries
 6. Design for Energy Efficient
 7. Use of Renewable Feedstocks
 8. Reduce Derivatives
 9. Catalysis (vs Stoichiometrics)
 10. Design for Degradation
 11. Real Time Analysis for Pollution Prevention
 12. Inherently Benign Chemistry for Accident Prevention
 - Focus on greener synthesis and properties of chemicals:
 - Less waste
 - Less energy
 - Less hazard
 - More renewable resources
 - Increasing Complex Products – Textiles, Plastics, Electronics, Communication, Digitalization, Automobile etc
 - Ewaste
 - Ca. 50 Mill t/year Ca. 5000 Eiffel towers per year (ca. 7 kg/inhabitant)
 - Annual Growth Rate: 4%!
 - Resources Are Running Short
 - Challenges: Recycling Depends on Collection Rates
 - Collection 30%
 - Disassembling 90%
 - Processing 60%
 - Chemistry 95%
 - New Thinking: Sustainability, Chemistry and the Role of Chemists
- The program ended with a vote of thanks by Mr. R. R. Gokhale. On behalf of ICC and T&E Expert Committee he thanked once again all the speakers and delegates who enthusiastically participated in the deliberations. ■

