



# LINDAU NOBEL LAUREATE MEETINGS

## Key Topics of the 67<sup>th</sup> Lindau Nobel Laureate Meeting (Chemistry)

### Big Data in Chemistry

Every day, chemists generate large amounts of new datasets that describe or predict the structure and behaviour of molecules. For example Nobel Laureate Kurt Wüthrich, who studies biomolecules using nuclear magnetic resonance spectroscopy. Also, X-ray crystallography, which Nobel Laureates Johann Deisenhofer, Robert Huber and Hartmut Michel used to analyse the photosynthetic reaction centre, produces huge datasets. In recent years, the amount of publically available data has massively increased: Public databases list millions of chemical substances, structures and reactions. With these ever-increasing amounts of available data, new technologies emerge to store, filter and analyse it. Which useful information can chemists extract from big data? How do they deal with the data deluge? Is there a limit to the amount of data that we will be able to handle in the future?

### Green Chemistry

Green Chemistry is aimed at reducing the release of hazardous compounds into the environment and the amount of energy used for chemical processes. Nobel Laureate Richard Schrock, for example, has developed new methods that make organic synthesis more environmentally friendly. Thanks to the work of Nobel Laureate Mario Molina and others, the use of chlorofluorocarbon (CFC) gases has been prohibited and the ozone layer, which was damaged by CFCs, is now recovering. Today, we face an even bigger environmental challenge: human activity causes global warming – with dramatic consequences. How can green chemistry contribute to combating climate change? What role do chemists play in deepening our understanding of the science behind climate change and in working towards solutions?

### Molecular machines

Our cells produce molecular machines: they transport cargo, manufacture the biomolecules we need to function and enable us to move. One of the most important of such biomolecular machines is the

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ribosome, which is responsible for the production of proteins within every living cell. Molecular machines are also a major focus of current research in synthetic chemistry: Chemists have designed and synthesised molecular motors, propellers and switches. These nanomachines could be used to generate new materials, detectors and energy storage devices. Bernard Feringa, Jean-Pierre Sauvage and Sir Fraser Stoddart were awarded the Nobel Prize in Chemistry in 2016 for the design of such molecular machines. What role will molecular machines play in material sciences and in medicine?

### Post-truth era

The word 'post-truth', which has been declared the Oxford Dictionaries Word of the Year 2016, reflects a political development that has gained momentum world-wide: Personal beliefs and emotions seem to have a larger influence on public opinion than objective facts. Politicians spread "alternative facts" and put them on the same level as evidence-based knowledge. To counteract this development, millions of people all over the world are planning a march for science to raise awareness of the importance of science in society. Science communication and public outreach have become more important than ever. What role does empirical science play in current affairs? Why are people skeptical of scientific facts? What are scientists doing to combat this?