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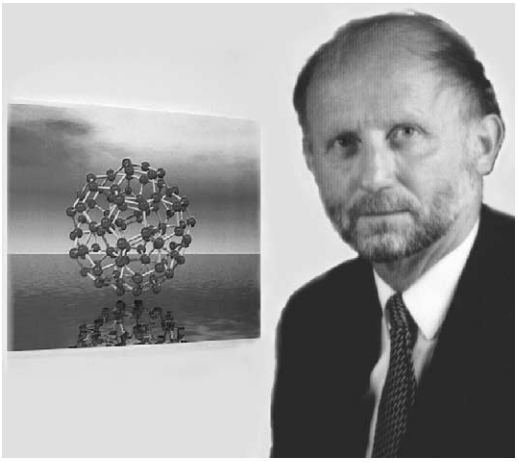
Dedication



Professor Achim Müller from the University of Bielefeld is a remarkable personality of today's chemistry and natural science. He was born in February 1938 and brought up in Detmold (Principality of Lippe, Germany). After his studies of Chemistry and Theoretical Physics he obtained his PhD degree in 1965 from the University of Göttingen and 2 years later, he received his habilitation from the same university. In 1971, he became Associate Professor of Inorganic Chemistry at the University of Dortmund and in 1977 he was appointed as Full Professor at the University of Bielefeld, where he is successfully active today, being Head of a Chair which has become a world center of excellence in Inorganic Chemistry. During his career Achim Müller approached a broad diversity of complex and sophisticated subjects, leaving a deep mark therein through his contributions.

Achim Müller has an impressive record of more than 800 published articles in the most prestigious specialized journals and of 12 volumes that he edited and contributed to as co-author. He enjoys high prestige in the scientific world and has been elected as member of a number of prestigious scientific bodies, such as Deutsche Akademie der Naturforscher Leopoldina (Germany), Academia Europaea (London), Académie Européenne des Sciences, des Arts et des Lettres (Paris), National Academy of Argentina, Polish Academy of Sciences. He is also honorary member of the Indian Chemical Society and *Doctor Honoris Causa* of the University of Wroclaw (Poland), the Babes-Bolyai University Cluj-Napoca (Romania) and the Lucian Blaga University Sibiu (Romania). He is the holder of several prestigious chemistry prizes, such as Alfred Stock-Gedächtnispreis (German Chemical Society, 2000), Prix Gay-Lussac/Humboldt (Ministère de la Recherche, Paris, France, 2001) and Sir Geoffrey Wilkinson Prize (2001). Furthermore he is a member of the Editorial Board of several international journals (including

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the *Journal of Molecular Structure*) and the International Committees of many conference series (including EUCMOS, the European Congress on Molecular Spectroscopy). He has been invited to present plenary lectures at a great many international conferences and is one of the first 20 most cited German authors in science.

It is interesting and significant that the results of Achim Müller's research went out to the limits of specialized scientific literature and have been commented upon with interest in newspapers and magazines from Germany (*Der Spiegel*), Spain (*El Pais*), France, England, India. In fact, he has contributed considerably to the popularisation of science.

Currently, the main areas of interest of Achim Müller cover the following domains:

1. *inorganic supramolecular chemistry*, focused mainly upon transition metals;
2. *aspects of bioinorganic chemistry*, connected with the extremely important problem of nitrogen fixation;
3. *heterogeneous catalysis,* oriented towards industrial applications;
4. *vibrational spectroscopy;*
5. *trace analysis* (mainly metals in biologic media); to name only the most important.

Of particular interest are his preoccupations with *science philosophy*, which have given him a place that many consider to be unique among today's chemists. Thus, he created a personal vision of chemical structures through his concepts referring to the relation and transition between simple and complex structures in chemistry, with interdisciplinary implications in physics and biology.

Achim Müller has shared the recent belief that chemists should move from the *chemistry of isolated molecules* to *the chemistry of complex associations of molecules*, which now constitutes the *supramolecular chemistry* and has become the main promoter of this vision in inorganic chemistry, through his review article 'Supramolecular Inorganic Chemistry: Small Guests in Small and Large Hosts' [1]. He is also a proponent of interdisciplinary research and contributed to the understanding of the role of transition metals in biological processes. Together with numerous members of his research team over the years he has made significant contributions to the preparative and structural chemistry of polysufido-complexes, in works relevant for heterogeneous catalysis, geology, biology and analytical chemistry. In the area of bioinorganic and prebiotic evolution research, he has made important contributions related to the synthetic modelling of nitrogenase and the biochemistry of nitrogen fixation, biosynthesis of nitrogenase co-factors and synthesis of models for the active sites of ferredoxins.

The most spectacular achievements in the scientific activity of Achim Müller are by far those in the field of supramolecular inorganic chemistry. He focused the attention and admiration of the scientific community by his publications over the last decade, with the successful synthesis of some unique, giant molecule-anions, with fascinating novel structures containing 132, 154, 176, 248 and even 368 molybdenum atoms. These purely inorganic chemical species are of particular interest especially on account of their size and shape by which they imitate the viruses. Additionally, the formation of such giant anions occurs through rapid processes of self-assembly, differing from the traditional methods of chemical synthesis, in which the complex structures are made step-by-step, in complicated, slow and little efficient processes. In fact, Mother Nature also works by constructing organic biological architectures through self-assembly and Achim Müller and his co-workers were successful in transferring these processes to the field of pure inorganic chemistry. They achieved this performance in the chemistry of polyoxometalates, compounds known for more than two centuries, but that revealed their secrets only in our days. The first spectacular results in this field came when his group could clarify the structure of the so-called 'molybdenum blue'. Generations of chemists have tried, without success, to obtain it in crystalline state and to establish its structure. This goal was achieved by Achim Müller who shocked the community of inorganic chemists by discovering, with the aid of X-ray diffraction, that molybdenum blue contains a giant ring anion having 154 molybdenum atoms. Under the name 'big wheel', this anion-molecule soon became a celebrity in chemistry. In a series of further sensational discoveries, he described the formation of some supramolecular structures, in which the big

wheel polymolybdate can be used as a unit in the formation of polymeric chains or layered bidimensional structures, i.e. inorganic supramolecular architectures of a totally new type. Subsequently, his group obtained multilayer spherical structures of polymolybdates, which he called 'keplerates'. These are inorganic 'superfullerenes', giant molecular spheres that incorporate icosahedral substructures just as the cosmogonic model of Kepler. This is a completely new, unprecedented chemistry, that could have not been anticipated a few years ago. With an eye to 'chemical aesthetics', Achim Müller explains in one of his papers: "Presents interest not only the production of mesoscopic (or nano-structural) objects with functional versatility, but also the aesthetic beauty of such assemblies" [2]. Thus, he underscores that "some structures, such as the spheric objects composed of pentagons and hexagons, can be often found both at the molecular and macroscopic level, following the same general principles of organisation" [2].

This story of success has not ended yet. In a recent paper [3] a new field has appeared on stage, not only that such keplerates can behave as specific nanosponges for certain organic ions, but that such filling of the pores induces the organisation of the water molecules inside the giant spheres into a fixed hierarchical structure of platonic and Achimedean solids. Within a short time many more examples of such trapped nanodrops of water with and without other ions have been detected. For the future, here we may expect some fundamentally new insights into the structure of those 'flickering' clusters present in liquid water and into the three dimensional structure of electrolyte solutions in general.

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