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Obituary – Prof. Dr. Wolfgang Peter Meier (1964–2022)

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The colloid and polymer science, as well as the physical chemistry communities were deeply saddened to learn about the premature death of Professor Dr. Wolfgang Peter Meier. He passed away on the 25th January 2022, after fighting relentlessly against a long illness.

Wolfgang Meier was born on 9th November 1964 in Biberach, Germany, where he was educated until he went to university. He studied chemistry at the University of Freiburg (Germany), where he graduated in 1989, and was awarded a PhD in macromolecular chemistry from the same university in 1992 with a thesis on the self-organization of liquid-crystalline elastomers. In 1993 he joined the University of Basel (Switzerland), where he was appointed lecturer in Physical Chemistry in 1996 and received his 'Habilitation' in 1998. In 2001, he was appointed Associate Professor at the International University of Bremen before moving back to the University of Basel as full Professor of Chemistry in 2003. His main research interests were in the fields of amphiphilic

copolymer synthesis and their hierarchical self-assembly, block copolymer vesicles (so-called polymersomes), and hybrid membranes.

Figure 1: Prof. Dr. Wolfgang P. Meier (1964 – 2022).

Wolfgang Meier was always fascinated by the crucial role that biological membranes play in the functioning of living organisms. At the structural level, he was fascinated by the stable and functional compartments that biological membranes provide through self-assembly. At a higher level of structural organization, he was intrigued by their ability to preserve cell architecture whilst supporting signaling and selective transport mediated by a variety of proteins embedded in and/or associated to the membrane. The major research activities of Wolfgang Meier were devoted to the synthesis of copolymers and to their self-assembly into membranes and compartments mimicking the biological cell membrane. He advanced this highly promising strategy by designing multifunctional hybrid materials and systems through the functional combination of polymer membranes with biological molecules, e.g. by reconstitution of membrane proteins into block copolymer membranes. Wolfgang Meier focused on finding solutions for sustained and targeted drug delivery, nanoreactors for confined reactions at the nanoscale, and engineering active surfaces.

Wolfgang Meier was since 2007 a member of the executive board and Vice Director of the Swiss Nanoscience Institute (SNI) and was, for more than fifteen years (2006 - 2022), coordinator for the unique "Nanoscience Curriculum" at the University of Basel. Moreover, he served as Head of the Department of Chemistry at the University of Basel for four years (2008-2011), was member of the Managing Board of the Alfred Werner Foundation (2005-2014), and member of the Advisory Board of the Hermann-Staudinger-Foundation (2007-2017) and of the Georg-Manecke-Foundation (2006-2022). He was a member of the Scientific Board of the National Center of Competence in Research (NCCR) Nanoscale Science (2004 – 2013) and initiated in 2012 the Molecular Systems Engineering NCCR, of which he was the Director until 2016. Throughout his career, Wolfgang Meier contributed significantly to the success of the Department of Chemistry of the University of Basel, of the SNI and of the two NCCRs by enlarging the boundaries of chemistry towards advanced functional materials science and devising elegant solutions to essential questions in the fields of polymer synthesis and nanoscience.

Apart from his commitment to research, he loved teaching and was an excellent mentor for several generations of students, early career scientists, and collaborators. His contribution to their life and careers is memorable. In particular, he played a crucial role in establishing the Nanoscience bachelor`s and master`s curricula at the University of Basel as a part of the SNI initiative. One of his strengths was to support early career researchers by providing them with substantial opportunities for learning to develop their own ideas and stand up for them. Wolfgang Meier's colleagues, students, collaborators, and friends cherish warm memories of his extraordinary intellect, creativity, warmth, and inspiring wisdom.

"*Wolfgang was a wonderful person and friend. Since the start of the Swiss Nanoscience Institute, he represented chemistry in the executive board of the SNI. I often delegated tasks to Wolfgang, since I knew they were in good hands. Also, Wolfgang was a true nanoscientist, since he loved the interdisciplinary setting of nanoscience, as he was interested in the field as a whole, and in particular also in the use of innovation for applications. He was responsible for the study program within the board, the only full bachelor and master program in Switzerland in Nanoscience. He shaped and developed this study program further, and for many students he became an example of a truly interdisciplinary scientist who was open to listening to others and trying to find solutions for everything and everyone. We will not forget his highly developed empathy and dedication to*

the good. He was always in good mood and could cheer us up also in bad times. I am personally very grateful to Wolfgang." Christian Schönenberger, Director of the SNI

"I, myself, had the privilege to be one of the very first PhD students of Wolfgang, when he was a privatdozent in physical chemistry at the University of Basel. This period was very unique to me. At this stage of his career, we could spend time together in the lab where he showed me how to form and extrude amphiphilic block copolymer vesicles. At that time, I had the chance to sit by his side, in his office, and realized how essential his family was to him! Not a single day without calling his wife and children during the lunch break. Throughout my whole career, the mentoring of Wolfgang greatly contributed to shape the scientist which I am today. Wolfgang not only came up with elegant solutions to essential questions in science but also, with his own kind and caring style, instilled the rigor needed to conduct research and critical thinking to train future creative and collaborative scientists. He devoted precious and priceless time to discussing science, and doubts, whether these were about research progress or career choice. He also strongly encouraged both incoming and outgoing mobility at every career stage. The most precious to me was that he had at heart the independence of the scientists he trained. As a mentor and as a lecturer, to infuse confidence was essential to him. I keep it in mind, especially when teaching to first-year university students, as, according to Wolfgang, this is the chance to raise students' interest for science very early in their education, whatever the discipline is, as nowadays, our research activities are trans- and multidisciplinary. I try to convey his caring advice and elegant approaches the best way I am capable of to the students and early-stage researchers that I am supervising today." Corinne Nardin, Professor, Université de Pau et des Pays de l'Adour, France

"Wolfgang gave me the possibility to start my independent research career under his mentorship in his labs. I was attracted to work with him due to his unique combination of expertise that comprised polymer chemistry, protein biotechnology, and nanosciences. When I came to Basel, I originally wanted to stay away from block copolymer self-assembly, in order to distinguish myself from my mentor. However, very rapidly Wolfgang infected me with his enthusiasm for these macromolecules and everything that one can do with them. Ever since, I have been actively working in the field of polymersomes, especially developing them as nanoreactors, delivery vehicles, and functional building blocks in biomolecular systems. I am immensely grateful for the inspiration Wolfgang gave his group members, including me, to investigate these self-assembled

structures, their properties, and their applications. Moreover, Wolfgang was immensely supportive and gave me the freedom to realize my own scientific ideas, including my group's work on enzymatic polymerizations and bio-inspired materials. Wolfgang was the best mentor I could have wished for during my habilitation, and I learned an incredible amount from him. Without him, I would not be the scientist I have become, and I am infinitely grateful to him. Above all, Wolfgang has become a good friend over the years, whom I now sorely miss." Nico Bruns, Professor of Sustainable Functional Polymers, Technical University of Darmstadt, Germany

"I had the opportunity to work together with Wolfgang for more than 18 years and explore how soft synthetic membranes and vesicles can be combined with biomolecules to generate functional systems. In our aim to bridge synthetic and natural assemblies and molecules we both had the challenge of a completely different expertise, his on polymers synthesis and their self-assembly into soft supramolecular assemblies, mine in biophysics of molecules and biointerfaces. We overcome it together by incredibly rich scientific discussions and challenging each other to watch out of the box. I admired his soft and peaceful manner to explain his ideas and wait for you to add yours in a holistic manner. His vision was extremely large and reached underexplored questions to get another view or solution. What mattered was the path for understanding and mimicking nature. What mattered was to advance and his strength, even in completely chaotic situations, was an extraordinary example. I am personally very grateful to Wolfgang for his positive attitude and encouragement over the years by showing that there is always hope both in science and in life." Cornelia G. Palivan, Professor in Physical Chemistry, University of Basel, Switzerland

His more than 250 publications, patents, and countless invitations as a speaker at international conferences, as well as his membership on editorial boards of numerous journals, reflect his world-leading role and outstanding international reputation. His research has been recognized by numerous prestigious international awards, such as the Ruzicka-Price in 2001 and the Hermann-Staudinger-Price in 2006 for his research in the field of hierarchical self-assembly of functional block copolymers, macromolecules, and hybrid materials.

His world-leading role at the boundaries of chemistry and nanosciences is reflected in the contributions from his colleagues, collaborators, friends, and mentees in this joint special issue of

Macromolecular Rapid Communications and *Macromolecular Bioscience* to commemorate his work and his life.

This joint special issue covers colloid and polymer science to such an extent that we'd like to heartedly thank all contributors and their co-authors for their contributions. Natural molecules, polymers and biomacromolecules, synthesis routes, material processing, functional assembly, characterization and investigation of interactions with living systems are at the core of the research activities described in this joint issue. The high potential for various applications of the resulting systems is further highlighted.

Current standing on radical ring-opening polymerizations of cyclic ketene acetals as homopolymers and copolymers with one another is reviewed by Jens Gaitzsch and coworkers. Visible light-atom transfer radical polymerization (ATRP) driven by tris(2 pyridilmethyl) amine impurities in the open air is described by Krzysztof Matyjaszewski and coworkers. The synthesis of multifunctional protein-polymer conjugates via oxygen-tolerant, aqueous copper-mediated polymerization and bioorthogonal click chemistry is reported by Kelly Velonia.

Amino acids were electropolymerized to prepare ultrathin and degradable polymeric films as described by Tanja Weil and her team, whereas experimental methods to get polydopamine films are comprehensively reviewed by Vincent Ball and coworkers. Histidine-functionalized diblock copolymer nanoparticles enhanced adsorption onto planar stainless steel is shown by Steven Arms and his team. Sulfobetain hydrogel-binding peptides were identified by phage display assays by Andreas Taubert and coworkers. Microgel-reinforced hydrogels were studied by Esther Amstad and collaborators, and the influence of the degree of swelling on their stiffness and toughness was investigated. Hydrogel microdots were studied by Brigitte Voit and coworkers for reversible capture and release in microfluidics. Membranes made of amphiphilic poly(vinyl alcohol) without chemical crosslinkers were designed by the group of Wilfredo Yave. A comprehensive preparation guideline using orthogonal strategies to develop nanocarriers with multiple cargo loads is provided by Katharina Landfester and coworkers, whereas compartmentalized intracellular chemistry with biodegradable polymersomes was conducted by Jan van Hest and his team. Encapsulation of fragrances in micro- and nanocapsules, polymeric micelles and polymersomes is reviewed by Nico Bruns and Sam Russel. Selective colloid transport across planar polymer brushes is highlighted by Oleg Borisov and coworkers.

Advanced characterization by ^{19}F magnetic resonance imaging probes is described by Dalin Wu and coworkers. The use of polymeric vesicles as a platform to study enzyme-mediated unlocking as described by Dietmar Appelhans and coworkers could be further used in the future for artificial organelle communication.

The current trends in the synthesis of polymer nano- and microscale materials for bio-related applications are reviewed by Cornelia Palivan and her group members. The contribution of the group of Joerg Huwyler describes synthetic and natural chitosan polymers to assemble core-shell structures for gene delivery. Investigations of pH-sensitive, hollow microgels for the encapsulation of proteins are reported by Walter Richtering and coworkers, whereas mechanosensitive drug delivery systems to treat vascular diseases are reviewed by Mihai Lomora and coworkers. Giuseppe Battaglia describes how to prepare phase-separated polymersomes through a bottom-up preparation. The response of human plasma proteins to polymersomes and to stealth liposomes is compared by Molly Stevens and coauthors, whereas the interaction of nanoparticles with supported lipid bilayers, depending on their size and their interaction with proteins, is described by Mihaela Delcea and coworkers.

At a higher level of structure formation, synthetic cell motility inspired the assembly of an artificial cytoskeleton, as reported by Ilia Platzman et al., whereas Harm-Anton Klok and coworkers reviewed the current chemical approaches to prepare bacteria -nano/microparticles hybrid systems.

Biochemical processes were shown to enable the preparation of a flow-through enzyme reactor as described by Peter Walde and coworkers. Surfaces coated with polymer brushes were shown to function as enzyme carriers by Brigitte Städler and coworkers. Enzymatic activity, when hindered by interaction with potentially harmful substances such as glyphosate, which reduces the activity of exonucleases, has been considered by Nardin and coworkers as a route to biosensing.

All these contributions exploring soft matter, bio-synthetic systems and a variety of polymers clearly indicate the extensive efforts to propose novel multifunctional solutions in various domains, including medicine, catalysis, and technology. The synergy of these approaches supports the vision of Wolfgang Meier and is meant to go one step further in bridging fields for integrative responses, both fundamental and in terms of applications.

A version of this obituary was also published in *Macromolecular Rapid Communications*.