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Matthias Barz, Lutz Nuhn,* and Patrick Theato**

This special issue of *Macromolecular Rapid Communications* celebrates the lifetime research achievements of Rudolf Zentel by contributions from companions, colleagues, and friends who had the pleasure and honor to get to know and work together with Rudolf during his successful career until his retirement from the Johannes Gutenberg-University (JGU) Mainz in 2021. For this occasion, this special issue was compiled by three of his academic offsprings (Matthias Barz, Lutz Nuhn, and Patrick Theato), who all started their academic careers in Rudolf's group and now gratefully look back on his excellent guidance and mentorship (**Figure 1**).

During the last 40 years, Rudolf's primary research interests were located in polymer science with a strong focus on materials' properties, for which he used a broad range of organic and macromolecular chemistry to expand their application horizons. A detailed overview of these achievements has been summarized by him recently.[1]

Rudolf studied chemistry at the JGU Mainz and performed his doctorate jointly supervised by both Helmut Ringsdorf (synthetic polymer science) and Gert Strobl (physics of soft matter and polymers). After a postdoctoral stay in Freiburg with Hans-Joachim Cantow, he returned back to Mainz in 1984 for his "Habilitation" on liquid crystalline polymers and elastomers with Helmut Ringsdorf. We are delighted that we could summarize a concept paper about the "Ringsdorf spirit" of that period for this special issue (2100829). This guest editorial article tries to capture the unique research lab atmosphere which Rudolf and many others were exposed to at that time and inspired him (and later on also us) to pursue a career in research. Colleagues and friends from that time who were part of the Ringsdorf lab and witnessed the "Ringsdorf spirit" include—among others—André Laschewsky and Hans-Werner Schmidt who, along with their co-workers, provided individual contributions to this special issue (2100589 and 2200052, respectively).

After research stays at the IBM Almaden Research Center (1989 to 1990) and the Heinrich Heine University Düsseldorf

Figure 1. In 2021, Rudolf Zentel retired from his position as full professor of polymer science at the Johannes Gutenberg-University Mainz. This special issue guest-edited by three of his academic offsprings (Matthias Barz, Lutz Nuhn, Patrick Theato) would like to pay tribute to him and his lifetime research achievements (the portrait of Rudolf Zentel was kindly provided by Katharina Maisenbacher).

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(1990 to 1992), Rudolf got his first professorship at the JGU Mainz in 1992. From there, he "hopped" via the University of Wuppertal (1996 to 2000) back to the JGU Mainz, where he was finally appointed as full professor of polymer science in 2000. During this period, Rudolf acquired different new research topics including "polymers for non-linear optics" (IBM), "chiral helical polymers" (Düsseldorf) as well as "semiconducting polymers and their patterning" and "artificial polymer opals as 3D photonic crystals" (Wuppertal). In addition, he started a close cooperation with Christopher K. Ober from Cornell University, with whom he organized a NATO Advanced Research Workshop in Italy in 1996,[2] and who has contributed a paper for this special issue along with his co-workers (2100629).

From that time onwards, Rudolf further diversified his research landscape and successfully included topics like "microfluidics for the processing of LC-elastomers", "organic-inorganic hybrid systems" and, during his last years at the JGU also "polymers for nanomedicines". Beyond focusing on materials' properties and applications, Rudolf's research was also driven by novel synthetic polymerization efforts including controlled radical polymerization techniques like RAFT and the use of monomers with reactive side groups. We are glad that we could collect contributions going back to macromolecular pioneer work in his lab by Marc Behl (with Stefan Baudis, 2100400) and Patrick Theato (with co-workers, 2100760), as well as subsequently initiated international cooperation and exchange programs with E. Bryan Coughlin (with S. Piril Ertem, 2100610) and Todd S. Emrick (with co-workers, 2100678).

Starting from 2006 onwards, Rudolf was highly successful in initiating several larger coordinated programs supported by the German Research Foundation (DFG). These achievements also underline Rudolf's excellent personal skills in bringing together people from various disciplines to jointly explore challenging research opportunities. As a result, Rudolf's first interdisciplinary research program was an international research training group (IRTG) on "Self-Organized Materials for Optoelectronics" (GRK 1404), which successfully ran from 2006 to 2015 together with Seoul National University in South Korea. It focused on materials for light emitting diodes (later also battery materials) and incorporated—from the chemical perspective—especially new findings on inorganic/organic hybrid materials. We are very glad that we can include contributions to this special issue which go back to collaborations with Kookheon Char (2100618), Tae-Lim Choi (2100642), Do Y. Yoon (2100614), Rüdiger Berger (2100733), Friederike Schmid (2100683), Kurt Kremer (2100907), and Stefano Passerini (2100820) and all their co-workers.

From 2013 onwards, Rudolf turned his attention to the once-proposed biomedical applications for polymeric materials of the Ringsdorf lab (see article 2100829) and he successfully initiated a Collaborative Research Center (SFB 1066) which is still receiving funding by the DFG until 2025. Together with partners from the Johannes Gutenberg University Mainz, the University Medical Center Mainz and locally associated research institutions (the Max Planck Institute for Polymer Research (MPIP), the Fraunhofer Institute for Microengineering and Microsystems (IMM) and the Translational Oncology (TRON) Research Organization) Rudolf set the foundation for novel concepts of "Nanosized Polymer Therapeutics for Tumor Immune-Therapy". In this context we are delighted that we could also collect diverse contributions from members and associated collaboration partners of the SFB 1066 including Matthias Barz (2100698), Pol Besenius (2100473), Matthias M. Herth (2100655), Satoshi Uchida and Kazunori Kataoka (2100754), Kaloian Koynov (2100892), Lutz Nuhn (2200095), Ernst Wagner (2100602), and Tanja Weil (2100413) with all their co-workers.

Fortunately, despite Rudolf's retirement the name "Zentel" will still go on in macromolecular science: His daughter Kristina just recently started a junior research group at the Technical University of Darmstadt focusing on polymer reaction engineering. We are very glad that her first independent research contribution devoted to her father is also part of this special issue (2100620).

Altogether, we thank each contributor to this special issue for celebrating Rudolf's incredible lifetime research achievements. We are all profoundly grateful to Rudolf for his caring help and endless support throughout the years. Not many people have had the privilege to work under and with someone as caring and understanding as Rudolf.

Last but not least, we would like to express our deepest gratitude also to Rudolf's wife, Sieglinde. Those of us who know Rudolf also know Sieglinde with her very kind nature. She has been standing with Rudolf throughout his career and continuously supporting him. We wish both of them a joyful, active and fulfilling retirement.

May Rudolf's fruitful advice remain available to all of us for a long time ahead.

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