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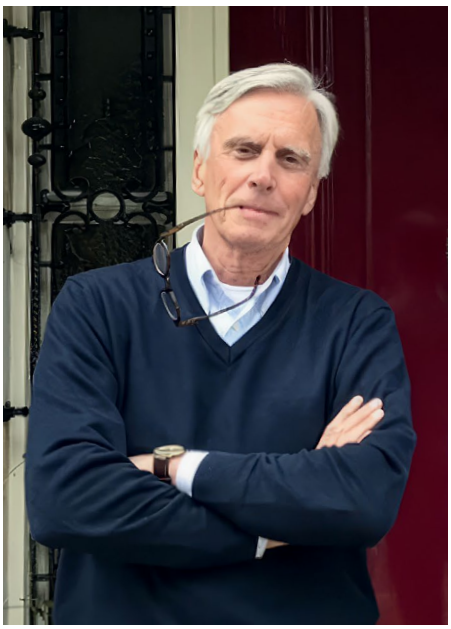
Roeland Nolte (1944–2024)

By Pall Thordarson & E. W. Meijer

Roeland J. M. Nolte was a titan of polymer science, supramolecular chemistry, and nanotechnology – known equally well for the breath and ambition of his work as for his kindness, warm nature and for being a true gentleman. His background was in physical organic chemistry, coming into the supramolecular chemistry field in the late 1980s. He went on to be one of the trailblazers of biomimetic nanotechnology at the turn of the millennium. He is best known for his pioneering work on the synthesis of bio-hybrid materials, for instance by combining enzymes and polymers to create novel nanostructures. His beloved polyisocyanide derivates and his biomimetic molecular machines (P. Thordarson et al., *Nature* **424**, 951–918; 2003) for catalysis, polymer threading and encoding of digital information have left a lasting legacy in the nanoscience field. His polyisocyanide-based hydrogels are used in many applications today, including biomaterials for cell growth.

What set Roeland apart from most other scientists was his 'Nolte approach', as it came to be known among the many scientists he mentored, who have since become successful researchers. He never hesitated to employ novel or unusual characterization methods or instruments to solve the research challenges he was working on. He was, for instance, one of the first chemists to routinely use electron and atomic force microscopy to study soft self-assembled materials. By the same token, he was also unafraid of switching between various classes of materials or molecules, rather than just sticking to one favourite system.

Roeland was born in 1944 in Bergh, The Netherlands. Already in high school, he became excited about chemistry and in 1973 he defended at the Utrecht University a truly fine dissertations on 'The synthesis and polymerization of isocyanides' under the mentorship of Wiendelt Drenth. Together with Yoshio Okamoto and Mark Green, he developed the field of chiral synthetic polymers into a large research area. He married Helma in 1969 and they had two children, and directly after his PhD, he became lecturer in Utrecht. In 1981 they enjoyed a sabbatical with Donald Cram at UCLA. This stay opened



his eyes to the power of supramolecular chemistry. Roeland always said that his stay with Cram changed his scientific thinking and moulded his approach to research for the rest of his life. It was the beginning of the field of supramolecular chemistry and Roeland noticed that. On his return to Utrecht, he directly started working on novel supramolecular hosts – the molecular clip – which, after his move to Nijmegen as a professor in 1987, became another mainstay of his research efforts.

Roeland's group in Nijmegen grew rapidly and his work started to converge towards the bio-hybrid materials that put him at forefront of the nanoscience field. At that time he also established strong ties and friendships with several other research groups in the Netherlands – making the country a global superpower of activity in supramolecular chemistry and nanoscience. Roeland was one of the members of the 'Dutch Golden Quartet of Supramolecular Chemistry', a term often used by Fraser Stoddart.

One of Roeland's favourite artists was the Dutch graphic artist M. C. Escher, widely recognized for his 'impossible' symmetry and geometrically elegant woodcuts and lithographs. With his pioneering cross-disciplinary approach, Roeland himself became known for making 'impossible' molecular materials and devices that frequently left the audience gasping when he presented these at conferences for the first time. There was often this remarkable beauty in Roeland's work, echoing Escher's art and ability to show order in the chaos. It was perhaps no coincidence that Roeland was an early adapter of microscopy methods because he always wanted to visualize the systems he was working on. He would illustrate this in his lectures, with beautiful slides including one with the braids of his daughter's hair alongside microscopy images to show supramolecular chirality.

Roeland loved working with students and continued to do so even after his formal retirement in 2010. He took up a special emeritus chair in molecular nanotechnology focusing on his quest for making molecular machines that could write data on to polymer, which he hoped would eventually lead to a catalytic molecular Turing machine. For that, he was awarded two times an ERC Advanced Grant after his formal retirement, an achievement without precedent.

Roeland was a true gentleman, an inspiration for his mentees and loyal caring friend. In addition, he was very humble, the interests of others always took precedence. He always tried to join the morning tea break in the lab and catch up with his students and co-workers. He was always excited every time that someone made a discovery, and he also had an amazing ability to understand the impact of these discoveries in a larger context but at the same time making sure that the person that obtain those results knew how incredibly proud he was of them. He will be deeply missed by all of us that had the fortune to know him.

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