Obituary

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Ian Manners (1961–2023)

By Geoffey Ozin

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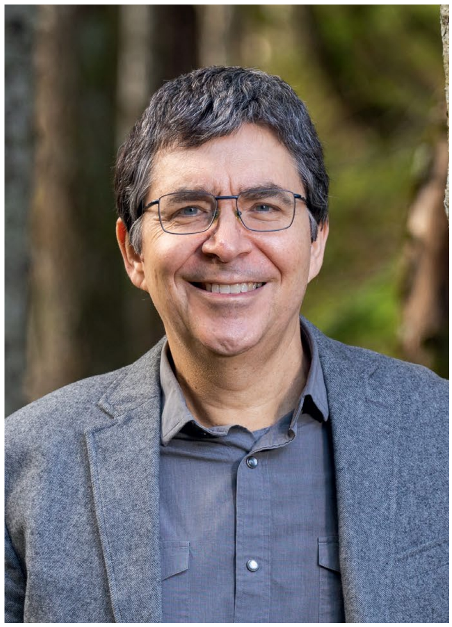
Ian is renowned for his innovative synthetic approaches to novel metallopolymer self-assembling architectures with structures that traversed from nanoscopic to macroscopic length scales. A passionate and dedicated lecturer, he inspired his students by always underlining the beauty and wonderment in chemistry and science.

By origin, Ian was a Londoner. His BSc and PhD were in chemistry at the University of Bristol, UK. Thereafter he was a postdoctoral fellow first at RWTH Aachen University (1986) in Germany and then at Pennsylvania State University, USA (1988). His first faculty position was at the University of Toronto in 1990. Subsequently, he returned to the UK in 2006 to assume a position at his alma mater in Bristol. Twelve years later he returned to Canada to a faculty position at the University of Victoria.

Ian's biggest contribution to polymer science probably began in 1992 with the invention of a novel bent-back, ring-strained silicon-bridged ferrocenylsilane precursor, which underwent a mild thermally induced ring opening polymerization reaction to create the archetype organometallic polymer poly-ferrocenophane. This groundbreaking discovery surprised and delighted aficionados of polymer science and technology. It gave birth to the field of organometallic polymers, which still flourishes today. His metallopolymers exhibit diverse compositions, nanoarchitectures and modes of functionalization, endowing them with unusual semiconductor, magnetic, and photolithography properties.

The first time I met Ian was during his interview for an Assistant Professorship in our department at the University of Toronto in 1990. He foresaw the self-assembly of modular inorganic and organometallic building blocks into polymers of a kind without precedence. Ian's ideas were astonishingly innovative. It was clear that he was a man on a mission, determined to make seminal and transformative contributions to the field of polymer materials chemistry.

Ian was an ardent believer in interdisciplinarity in science. Around a decade ago, we developed a new course in polymer materials chemistry where we team-taught students with backgrounds at the interface between chemistry and materials science. Ian was



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adamant that more chemistry concepts should be introduced in polymer science curricula, which at the time mainly focused on the physics and engineering aspects.

In research, his curiosity towards nanoscience led to our joint discovery of tunable photonic crystal colour materials. Ian had developed these swellable and shrinkable poly-ferrocenylsilane gels, while I was getting interested in structural colours. We realized we could make coloured materials by exploiting the diffraction of light from a synthetic periodic nano grating, the spacing of which could be varied through chemical, physical or mechanical stimuli, thanks to the ability of Ian's gels to respond to external stimuli. The technological opportunities were boundless and resulted in our co-founding of a spin-off company (http://www.opalux.com/) led by one of our join students, Andre Arsenault.

The photonic crystal experience cemented our collaborative efforts. Sure enough, Ian came up with another great insight shortly after. Inspired by the tenets of nanoscience, he realized that shape must be everything also in the polymer world. This led to an unprecedented synthetic effort of hybrid organic–inorganic structures over multiple length scales, but with controlled nanoscale shapes, one of which encompassed polymers, ceramics, metal bar-coded nanorods templated by alumina nanochannel membranes. This led to our establishing the field of chemically powered nanorod motors, a new type of locomotion at the nanoscale. This field has mushroomed into a veritable nanomotor industry from which a range of technologies have emerged that include mobile drug delivery and release, and pollution control systems. In another collaborative adventure we discovered that his organometallic polymers were unique precursors for the creation of a novel class of magnetic nanoceramic materials with potential utility in cancer therapy and information storage.

Ian had a spectacular collaboration with Professor Mitchell Winnik in our department. A noteworthy breakthrough was the discovery that poly-ferrocenosilane block copolymers self-assembled in solution into rod-like micelles, distinct to spherical micelles found with organic block copolymers. Through variations of the nature of the organic and organometallic blocks, a zoo of novel micelle architectures were uncovered.

Ian was a renaissance chemist with wide-ranging expertise across the borders of the science and engineering disciplines. Besides piercing scientific insights, he remained always keen to explore and experiment on potential applications of his materials for advanced technologies. He certainly foresaw early on a cornucopia of opportunities for polymers that incorporated the inorganic elements of the periodic table in the fields of advanced responsive materials and biomedical science.

His contributions to the field of polymer and materials chemistry have made the world a better place.

Geoffey Ozin
University of Toronto, Department of Chemistry, Toronto, Ontario, Canada.
e-mail: g.ozin@utoronto.ca

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Additional information

G.O. was a colleague of Ian Manners for more than 15 years at the University of Toronto, Canada. They co-authored around 50 papers.