
This special issue includes 4 reviews and 29 original research manuscripts, including authors from 12 different countries and 31 different institutions. This special issue of Polymer Chemistry showcases leading research directions in relevant current areas of polymer science and demonstrates the enabling character of current polymer research at the interface with the biological sciences, surface science, photophysics and supramolecular chemistry. The creative and innovative research advancements reported here highlight the widespread impact of polymer chemistry research: from new polymerization techniques (e.g. DOI: 10.1039/C8PY01141E and DOI: 10.1039/C8PY01556B), to the tailored release of bioactive small molecules (e.g. DOI: 10.1039/C9PY00354A, DOI: 10.1039/C8PY01539B and DOI: 10.1039/C9PY00157C), to fundamental understanding of how chemical structure dictates self-assembly and bulk properties (e.g. DOI: 10.1039/C8PY01463A, DOI: 10.1039/C9PY00162J and DOI: 10.1039/C9PY00230B). We celebrate and praise the continued and ongoing contributions of the authors assembled in this volume to the field of polymer chemistry and thank them for their contributions to this special issue. We hope you enjoy reading the pioneering contributions of this Polymer Chemistry special issue!

**Reviews:**
- Functional protein materials: beyond elastomeric and structural proteins
- Polymer brush interfaces for protein biosensing prepared by surface-initiated controlled radical polymerization
- Recent advances in colloidal nano-composite design via heterogeneous polymerization techniques
- Layer-by-layer assembly nanofilms to control cell functions

**Communications:**
- Improved maleability of mini-emulsion-based vitrimers through in situ generation of carboxylate surfactants
- Ring-opening metathesis polymerization-induced self-assembly (ROMPISA) of a cisplatin analogue for high drug-loaded nanoparticles
- Self-amplified depolymerization of oligo(thiourethanes) for the release of COS/H₂S
- Site-specific conjugation of anti-freeze proteins onto polymer-stabilized nanoparticles
- Integration of metal-free ring-opening metathesis polymerization and organocatalyzed ring-opening polymerization through a bifunctional initiator
- A fluorescent pillarene coordination polymer

**Articles:**
- Cooperative supramolecular polymerization of phosphorescent alkynylgold(i)-isocyanide complexes
- Tuning photosensitized singlet oxygen production from microgels synthesized by polymerization in aqueous dispersed media
- Structure and luminescence properties of supramolecular polymers of amphiphilic aromatic thioether-peptide conjugates in water
- Topochemical polymerization of hierarchically ordered diacetylene monomers within the block copolymer domains
- Shape modulation of squaramide-based supramolecular polymer nanoparticles
- Spatial control of the topography of photo-sensitive block copolymer thin films
- Self-assembly of oppositely charged polyelectrolyte block copolymers containing short thermoresponsive blocks
- Ferulic acid-based reactive core-shell latex by seeded emulsion polymerization
- Transformation of polyethylene into a vitrimer by nitroxide radical coupling of a bis-dioxaborolane
- Selective or living organopolymerization of a six-five bicyclic lactone to produce fully recyclable polyesters
• Transition metal-free thiol–yne click polymerization toward Z-stereoregular poly(vinylene sulfide)
• The effect of chain architecture on the phase behavior of A₄B₄ miktoarm block copolymers
• Design and synthesis of a dual imageable theranostic platinum prodrug for efficient cancer therapy
• Precision design of vinyl amine and vinyl alcohol-based copolymers via cobalt-mediated radical polymerization
• Understanding the ring-opening polymerisation of dioxolanones
• Metal–organic insertion light initiated radical (MILRad) polymerization: photo-initiated radical polymerization of vinyl polar monomers with various palladium diimine catalysts
• Synthesis and crystallization behavior of regioregular-block-regiorandom poly(3-hexylthiophene) copolymers
• Evolution of diverse higher-order membrane structures of block copolymer vesicles
• Polyampholytic graft copolymers based on polydehydroalanine (PDha) – synthesis, solution behavior and application as dispersants for carbon nanotubes
• Hierarchical patterns with sub-20 nm pattern fidelity via block copolymer self-assembly and soft nanotransfer printing
• Surface modification of self-assembled isoporous polymer membranes for pressure-dependent high-resolution separation
• Mechanically robust photodegradable gelatin hydrogels for 3D cell culture and in situ mechanical modification

Biographies of contributors

Emily Pentzer, Polymer Chemistry Associate Editor

Pol Besenius was born in Luxembourg in 1981 and studied chemistry at the Vienna University of Technology in Austria, and at the University of Strathclyde in Glasgow, Scotland. He received his PhD from the same institution in 2008, under the supervision of Prof. Peter Cormack and Prof. David C. Sherrington FRS, in collaboration with Prof. Sijbren Otto and Prof. Jeremy K. M. Sanders FRS at the University of Cambridge. As a Marie-Curie Fellow, Pol undertook postdoctoral studies at the Eindhoven University of Technology with Dr Anja Palmans and Prof. E. W. “Bert” Meijer. In 2011, Pol moved to the University of Münster to set up an independent research group at the Organic Chemistry Institute, supported by a Liebig Fellowship. He was also elected as young fellow to the North Rhine-Westphalian Academy of Sciences and Arts. In 2015, he took up a Professorship at the Institute of Organic Chemistry at the University of Mainz. His research interests include macromolecular chemistry, self-assembly in water and on surfaces, and responsive supramolecular materials.

Joona Bang received his B.S. degree in Chemical Engineering from Seoul National University in 1999. He received his Ph.D. degree from the University of Minnesota in 2004 on block copolymer physics. Then, he worked as a postdoctoral fellow at the University of California, Santa Barbara. Since 2006, he has been at Korea University as a Professor. His research interests focus on the synthesis and characterization of well-defined functional copolymers having non-linear architectures, such as stars and bottlebrushes, using living free radical polymerization, and surface modification of quantum dots for enhanced stability and improved performance in a variety of light emitting applications.

Idriss Blakey graduated from the Queensland University of Technology,
Andrew J. Boydston began studying chemistry as an undergraduate at the University of Oregon under the guidance of Professor Michael M. Haley. His research focused on the synthesis and study of dehydrobenzoannulenes. After completing BS and MS degrees, he began doctoral research at the University of Texas at Austin. While being co-advised by Professor Christopher W. Bielawski and Professor C. Grant Willson, Andrew completed his thesis research focused on the synthesis and applications of annulated bis(imidazolium) chromophores in 2007. He then took an NIH postdoctoral position at the California Institute of Technology under the mentorship of Professor Robert H. Grubbs. There, he developed new catalysts and methods for the synthesis of cyclic polymers. He returned to the Pacific Northwest as an Assistant Professor of Chemistry at the University of Washington in 2010 and was promoted to Associate Professor with tenure in 2016. In 2018, he moved to the University of Wisconsin as the Yamamoto Family Professor of Chemistry, where he also holds affiliate appointments in the Department of Chemical and Biological Engineering and Department of Materials Science and Engineering. His research group currently focuses on developments in the areas of polymer synthesis, mecanochemical transduction, and additive manufacturing (3D printing).

Sylvain Caillol was born in 1974 in Sète, France. He received his M.Sc. degree in Chemistry from the Engineering School of Chemistry of Montpellier. Then, he received his PhD degree in 2001 from the University of Bordeaux. Subsequently, he joined the company Rhodia. Later, after being promoted to Department Manager, he headed the Polymer Research Department in the Research Center of Aubervilliers. In 2007 he joined the CNRS at the Institute Charles Gerhardt of the University of Montpellier where he started a new research topic dedicated to green chemistry and speciality polymers. He is a co-author of more than 150 articles, patents and book chapters and is a member of the Editorial Boards of European Polymer Journal and Green Materials. He is Chairman of the “Oleochemistry, Molecule and Polymer Science” division of the European Federation of Lipids. He won the Innovative Techniques for Environment award in 2010 and the Green Materials Prize in 2018.

Luis M. Campos is an Associate Professor in the Department of Chemistry at Columbia University. He was born in Guadalajara, Mexico, and moved at the age of 11 to Los Angeles, California. He received a B.Sc. degree in Chemistry from CSU Dominguez Hills in 2001, and a Ph.D. from the Department of Chemistry & Biochemistry at UCLA in 2006 working under the supervision of M. A. Garcia-Garibay and K. N. Houk. At UCLA, he was awarded the NSF Predoctoral Fellowship, the Paul & Daisy Soros Fellowship, and the Saul & Silvia Winstein Award for his graduate research in solid-state photochemistry. Switching to materials chemistry, he went to UCSB as a UC President’s Postdoctoral Fellow to work under the supervision of C. J. Hawker at the Materials Research Laboratory. At Columbia, his group’s research interests lie in polymer chemistry, self-assembly, and organic electronic materials. To date, he has co-authored over 80 articles and 12 patents; and he has received various awards, including the ACS Arthur C. Cope Scholar Award, ONR Young Investigator Award, NSF CAREER Award, 3 M Non-Tenured Faculty Award, I-APS Young Faculty Award, the Journal of Physical Organic Chemistry Award for Early Excellence, and the Polymers Young Investigator Award. In addition to these research accolades, Luis has been recognized for his pedagogical contributions by the Cottrell Scholar Award, Columbia University Presidential Teaching Award, and the Camille Dreyfus Teacher-Scholar Award.
Eugene Y.-X. Chen came to the United States for graduate studies from China in 1991 and received his Ph.D. degree from the University of Massachusetts, Amherst, in 1995, under the direction of late Professors James Chien and Marvin Rausch. After a postdoctoral stint at Northwestern University with Professor Tobin Marks, he joined The Dow Chemical Company in late 1997, where he was promoted from Sr. Research Chemist to Project Leader. He moved to Colorado State University in August 2000, where currently he is the John K. Stille Endowed Chair in Chemistry and the Millennial Professor of Polymer Science & Sustainability. His research interests encompass broadly the areas of polymer science, green and sustainable chemistry, and catalysis.

Antoine Debuigne is a permanent researcher of the National Fund for Scientific Research (FNRS) at the University of Liege, Belgium. He obtained his Ph.D. from the University of Liege in 2004 under the supervision of Prof. Robert Jérôme in the Center for Education and Research on Macromolecules (CERM). After graduation, he was a postdoctoral fellow in the group of Prof. Michael K. Georges at the University of Toronto and developed controlled radical polymerization methods under emulsion conditions. In 2006, he returned to Liege as a FNRS Postdoctoral Researcher and was promoted to a FNRS Research Associate in 2010 at the CERM. His research interests deal with macromolecular engineering essentially based on radical chemistry and emulsion polymerization.

Jianzhong Du received his PhD in chemistry in 2004 from the Institute of Chemistry, Chinese Academy of Sciences. Then, he worked as a research fellow at the University of Sheffield (2004–2008), the University of Cambridge and the University of Warwick (2008–2010). He was an Alexander von Humboldt fellow in Germany (2006). He was appointed as an ‘Eastern Scholar’ professor at Tongji University in Shanghai in 2009, and an adjunct Professor in Shanghai Tenth People’s Hospital in 2015. Currently, he is Head of Department of Polymeric Materials, Tongji University. His research interests focus on the synthesis and application of smart and functional polymers and polymer vesicles. He has wide research interests in the interdisciplinary bridging between polymer science, nanomedicine, and materials science, such as controlled drug delivery, gene delivery, antibacterial materials, theranostic vesicles, the treatment of diabetes, etc. Since 2003, he has published 65 papers as the corresponding author and 14 papers as the first author in Chem. Soc. Rev., Prog. Polym. Sci., J. Am. Chem. Soc., Angew. Chem., Adv. Mater., Chem. Sci., ACS Nano, Nano Lett., ACS Macro Lett., Polym. Chem., Macromolecules, Biomacromolecules, etc. He received the National Award for the Progress in the Science and Technology in 2016 and the Innovative Research Article Award for Basic Research in Polymer Science, Chinese Chemical Society in 2017. He is a fellow of the Royal Society of Chemistry (FRSC), a member of the Biomacromolecules Editorial Advisory Board, and a Committee Member of the Division of Polymer Science, Chinese Chemical Society.

Nathan C. Gianneschi received his B.Sc (Hons) at the University of Adelaide, Australia, in 1999. In 2005 he completed his Ph.D at Northwestern University. Following a Dow Chemical postdoctoral fellowship at The Scripps Research Institute, in 2008 he began his independent career at the University of California, San Diego, where, until June 2017, he was a Teddy Traylor Scholar and a Professor of Chemistry & Biochemistry, NanoEngineering and Materials Science & Engineering. In July 2017, Nathan moved his research group to Northwestern University where he is currently a Jacob & Rosaline Cohn Professor of Chemistry, Materials Science & Engineering, and Biomedical Engineering. The Gianneschi group takes an interdisciplinary approach to nanomaterials research with a focus on multifunctional materials with interests that include biomedical applications, programmed interactions with bio-
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Matthew I. Gibson holds a personal chair joint between the Department of Chemistry and the Medical School at the University of Warwick, UK. He obtained his undergraduate degree (2003) and PhD (2007) from the University of Durham, UK, working with Prof. Neil Cameron. After a postdoc at EPFL with Prof. Harm-Anton Klok, Matt was appointed at Warwick in 2009 and promoted to Full Professor in 2016. Matt holds an ERC starting grant and has won several awards including the MacroGroup Young researchers medal, the Dextra medal for Carbohydrate Science, the PAT young talent prize and the 2018 Macromolecules/ Biomacromolecules Young Investigator Prize. Matt’s research addresses healthcare challenges including pathogen detection/neutralisation and new technologies for the storage and transport of biologics using a combination of polymer and glyco-science.

E. Bhoje Gowd was born in Kummara Nagepalli, Anantapur district, Andhra Pradesh. He received his B.Sc. and M.Sc. (Tech) in Polymer Science and Technology from Sri Krishnadevaraya University, Anantapur, Andhra Pradesh, and his Ph.D. from the University of Pune, Pune (work carried out at CSIR-National Chemical Laboratory under the guidance of Dr C. Ramesh). He worked as a post-doctoral fellow in Prof. Kohji Tashiro’s group at the Toyota Technological Institute, Nagoya, Japan, and as an Alexander von Humboldt Fellow in Prof. Manfred Stamm’s group at the Leibniz Institute of Polymer Research, Dresden, Germany. After a short stay at the Indian Institute of Science, Bangalore, as a Centenary post-doctoral fellow in Prof. S. Ramakrishnan’s group, he joined the National Institute for Interdisciplinary Science and Technology (CSIR-NIIST), Thiruvananthapuram, as a DST-SERB Ramanujan Fellow. In 2011, he accepted the Senior Scientist position at CSIR-NIIST. He was awarded an IUSSTF research fellowship by Indo-US Science and Technology Forum in 2014 (Stony Brook University, Stony Brook, NY, USA) and the Raman Research Fellowship by CSIR, Government of India, in 2018 (National Tsing Hua University, Hsinchu, Taiwan). He was the recipient of the Materials Research Society of India (MRSI) Medal in 2016 and the Professor Kaushal Kishore Memorial Award of The Society for Polymer Science, India (SPSI) in 2018. He has authored more than 50 publications in peer-reviewed journals, edited a book and contributed to 4 book chapters. He has been invited to deliver talks at different forums from countries like Japan, USA, Italy, France, Germany, China, and Taiwan. His research interests are in the areas of polymer self-assembly, nanostructured materials, polymorphic phase transitions in semicrystalline polymers, polymer/inorganic hybrid nanocomposites, polymer–solvent complexes and biodegradable polymers.

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Marleen Kamperman is interested in the biologically-inspired synthesis of polymers and nanostructured surfaces with controlled adhesive and mechanical properties. She received her PhD in Materials Science & Engineering from Cornell University, Ithaca, NY, where she worked in the group of Prof. Wiesner on the development of ordered mesoporous high-temperature ceramics using block copolymers. From 2008 to 2010, she was a postdoctoral researcher in the Functional Surfaces group of Prof. Arzt at INM – Leibniz Institute for New Materials in Saarbrücken, Germany, where she worked on the development of bio-inspired responsive adhesive systems. She started her group ‘Bioinspired Functional Polymers’ at Wageningen University in the Physical Chemistry and Soft Matter department in September 2010. In 2015, she became a member of the Dutch Young Academy. In 2018 she was appointed Full Professor in Polymer Science at the University of Groningen. In the new research group that she established in Groningen she combines her experience in polymer science and material development with her interest in bio-inspiration. In 2018 she was awarded the Van Marumpenning from the Royal Netherlands Chemistry Society.

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Felix H. Schacher studied chemistry at the Universities of Bayreuth (Germany) and Lund (Sweden) and obtained his diploma in 2006. After his PhD under the supervision of Axel H. E. Müller in 2009, he joined the group of Ian Manners at the University of Bristol as a DAAD postdoctoral fellow. In 2010 he was appointed as a Junior Professor at the Friedrich-Schiller-Universität Jena and became a Full Professor at this institution in 2015. He has been awarded the Dr-Hermann-Schnell-Fellowship of the GDCh in 2013. His scientific interests include controlled/living polymerization techniques, block copolymers, polyelectrolytes, and polyampholytes – all in the context of using (directed) self-assembly processes for material design in the fields of membranes, hybrid materials, and biomedicine.

Michael P. Shaver, FRSC, is a Professor of Polymer Science in the School of Materials at the University of Manchester where he leads initiatives in sustainable polymers, plastics and materials for the School and for the Henry Royce Institute, the UK’s national materials science centre. Following a PhD in his native Canada from the University of British Columbia and an NSERC Post-Doctoral Fellowship at Imperial College London, he began his independent research career at the University of Prince Edward Island before moving to Scotland in 2012 where he was a Chancellor’s Fellow, Reader and Professor of Polymer Chemistry. He leads the Green Materials Laboratory on the development of sustainable materials, including new motifs for renewable, degradable and chemically recyclable materials. His work ranges from fundamental projects rooted in monomer design to working with industrial partners in plastic packaging, medical diagnostics and sustainable materials. He was the inaugural Editor-in-Chief of the international journal Green Materials before his current role as Editor of the European Polymer Journal. He has been recognised with >80 invited lectures, the MacroGroup Young Polymer Scientist award (2015), the Young Academy of Scotland (2014–2018), a Fellowship in the RSC (2018) and two Canada Foundation for Innovation Leadership Awards (2010, 2012).

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He received his Ph.D from the University of Sydney in 2008 under the supervision of Professor Robert Gilbert in the area of emulsion polymerization kinetics and mechanism. He has held post-doctoral positions at the University of Toronto and the University of Sydney, working in the areas of polymer nanoparticle and polymer thin film design. In 2012 he joined the Centre for Advanced Macromolecular Design (CAMD) at UNSW as a Vice-Chancellor’s Research Fellow, and was appointed Lecturer at the University of Tasmania in 2015. Stuart’s research interests primarily focus on the physical chemistry of soft matter, namely polymer nanoparticles, colloids and interfaces, where he utilizes advanced polymerization techniques for the design of new materials. Stuart has published 49 journal articles in his career to date and presented his work at over 70 national and international conferences.

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