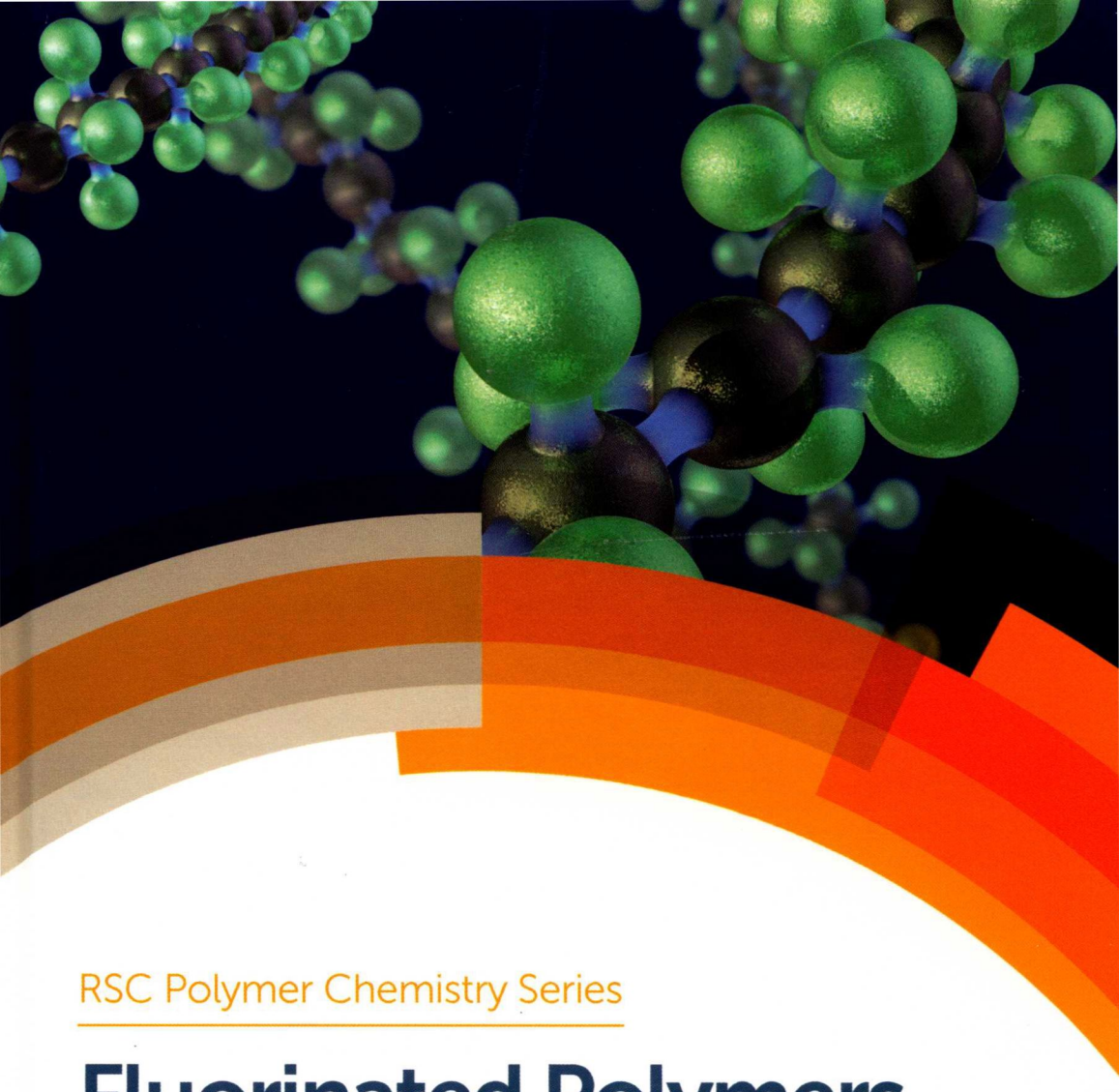

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Preface

Because of the increasing need for better performing materials endowed with specific properties for high-tech applications, fluoropolymers have undergone a rapid development. Since their discovery in the 1930s, these niche specialty polymers have been regarded as unique macromolecules with an exceptional combination of characteristics (derived from the strong C–F bond, such as chemical resistance, heat and light stability, electrical insulation and liquid and soil repellency) to provide superior performance in the chemical, medical, aerospace, automotive, electrical and electronics industries.

The relationship between the structures of the monomers and the properties of the resulting (co)polymers is of increasing interest in order to tune these properties towards the most appropriate applications.

These fluoroplastics or fluoroelastomers have already been involved in many applications, ranging from surfactants, optical fibers, biomaterials, liners or ultrathin layers, electronics, seals and O-rings for the aerospace and automotive industries, coatings, piezoelectric devices, electrolytes and separators for lithium ion batteries and back-sheets for photovoltaics to membranes for seawater desalination and fuel cells. These polymers are nowadays experiencing enormous growth and their production is increasing by 7% yearly. In the last decade, around 10 reviews, chapters and books have been published that witness the great interest in these materials.

Fluorinated Polymers is composed of two volumes and includes 23 chapters written by internationally recognized industrial and academic experts, outlining fundamental concepts and applied topics, starting with a general introduction. Then, emphasis is placed on recent developments and challenges, and most chapters describe comprehensive techniques of synthesis, characterization and properties of fluoropolymers (FPs). Volume 1 is devoted to the basic aspects of FPs, including the chemistry, synthesis of

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key reactants and techniques of polymerization, processing, and simulation, while Volume 2 concerns specific characterization and applications. Regarding syntheses, those of initiators (especially peroxides, Chapter 1, Volume 1), monomers (Chapter 2, Volume 1), oligomers (Chapter 4, Volume 1), well-defined fluorotelomers (Chapter 11, Volume 1 and Chapter 1, Volume 2) and alternating copolymers (Chapters 9 and 10, Volume 2), are highlighted, in addition to fluoroplastics and fluoroelastomers (Chapters 3 and 4, Volume 2) and key (co)polymers such as polyacrylates (Chapter 8, Volume 1 and Chapters 1 and 2, Volume 2), polyaromatics (Chapter 5, Volume 1), PVDF (Chapter 6, Volume 2), polyphosphazenes (Chapter 3, Volume 2), perfluoropolyethers (Chapters 5 and 7, Volume 2), copolymers and terpolymers based on vinylidene fluoride (Chapter 7, Volume 1 and Chapter 6, Volume 2), tetrafluoroethylene (Chapter 9, Volume 2), or chlorotrifluoroethylene (Chapters 5 and 10, Volume 2). In addition, common synthetic methods such as anionic polymerization (Chapter 3, Volume 1) and radical polymerization in supercritical CO_2 (Chapter 7, Volume 1) and specific processes such as electrochemical (Chapter 6, Volume 1) and melt processing (Chapter 10, Volume 1) complete these aspects, while Chapter 11, Volume 1 brings an insight into simulation.

This book also outlines some characterizations of FPs such as the surface properties of poly(acrylate)s (Chapter 8, Volume 1 and Chapters 1 and 2, Volume 2), self-assembly of well-architectured FPs (Chapter 9, Volume 1) and their applications in paints and coatings (Chapters 5 and 6, Volume 2), energy storage and conversion (Chapter 5, Volume 1 and Chapters 7, 8 and 9, Volume 2) and nanomaterials for specific applications (Chapters 11 and 12, Volume 2). In addition, environmental aspects (Chapters 1 and 2, Volume 2) are also supplied.

We would like to thank all contributors for their valuable chapters listed above.

These volumes, for immediate use by today's engineers and industrial and academic scientists and researchers, and also for graduate students, working in the fields of materials science, polymer chemistry and energy applications of polymers have been arranged to facilitate self-managed reading and learning. They are both a source of data and a reference.

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