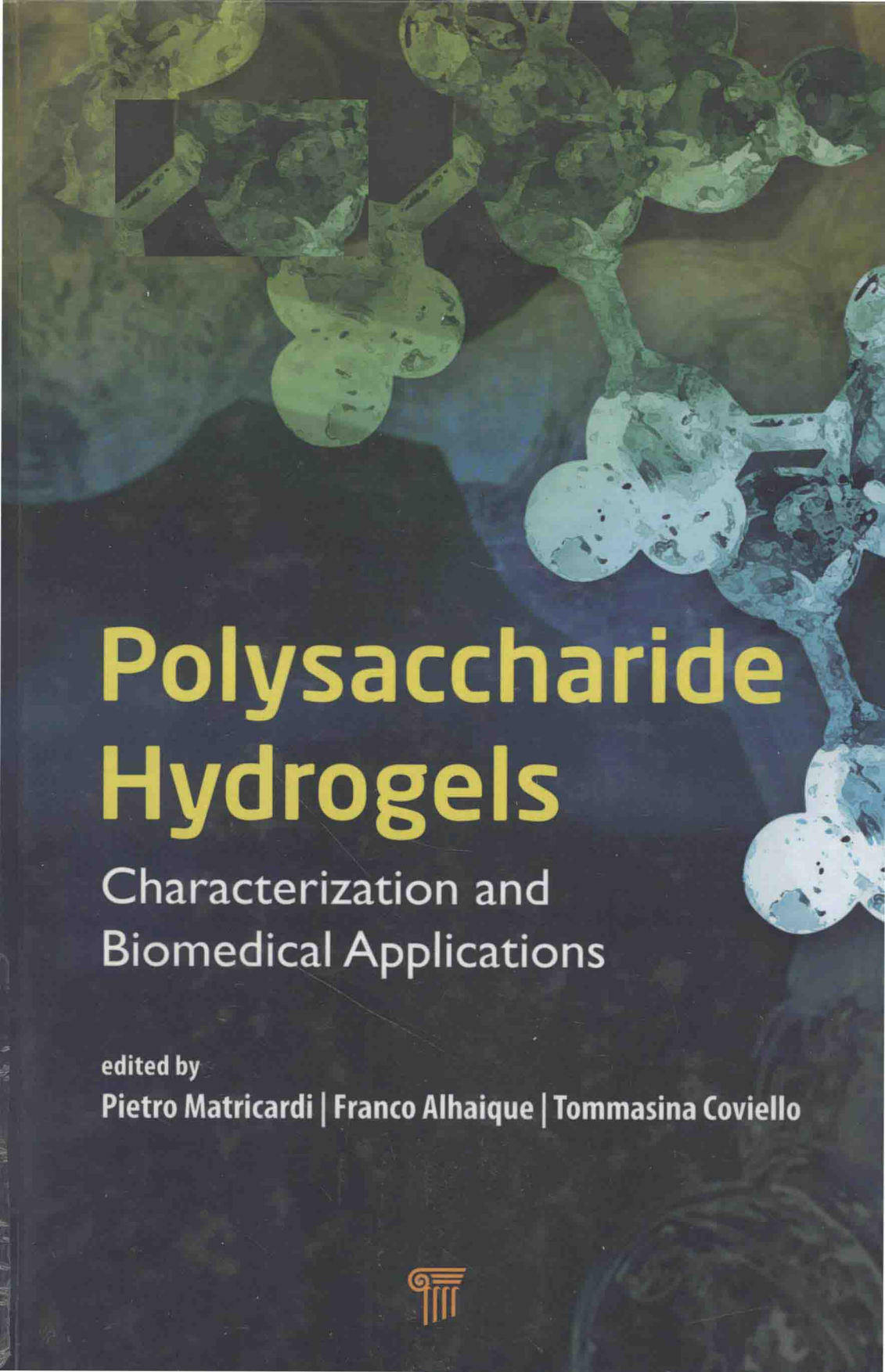

Polysaccharide Hydrogels

Characterization and Biomedical Applications

edited by
Pietro Matricardi | Franco Alhaique | Tommasina Coviello

"This book unveils the secrets of polysaccharide hydrogels that make them invaluable tools in the biomedical field. It presents elegant approaches to preparing hydrogels, techniques for a very detailed characterization of polysaccharides and their hydrogels, and recent applications."

Prof. Carmen Alvarez-Lorenzo
University of Santiago de Compostela, Spain

"This book is one of the first to cover all the aspects of polysaccharide hydrogels from the basic aspects of chemistry and characterization to their biological relevance and medical applications and is a great and comprehensive answer to the first questions concerning hydrogels."

Prof. Pierre Weiss
University of Nantes, France

"'The gel is easier to recognize than to define' (Dorothy Jordan Lloyd, 1926). This book gives significant answers to this 'old' but still intriguing statement as it brings together most of the up-to-date information on the hot topic of hydrogels obtained from polysaccharides, and their preparation, characterization and application in the field of pharmaceutics."

Prof. Gaetano Giammona
University of Palermo and The Biophysics Institute, Italy

Hydrogels are an emerging area of interest in medicine as well as pharmaceutics, and their physico-chemical characterization is fundamental to their practical applications. Compared with synthetic polymers, polysaccharides that are widely present in living organisms and come from renewable sources are extremely advantageous for hydrogel formation. Furthermore, polysaccharides are usually non-toxic and biocompatible and show a number of peculiar physico-chemical properties that make them suitable for a wide variety of biomedical applications. This book bridges the gap between the preparation of hydrogels and their characterization techniques. It aims to offer a valid support that can help the readers find appropriate keys to open the doors to the complex world of polysaccharide hydrogels.

Pietro Matricardi is assistant professor at the Department of Drug Chemistry and Technologies, University of Rome "La Sapienza", Italy. His scientific activity is focused on the development of new polysaccharide hydrogels for drug delivery applications and on the physico-chemical characterization of hydrogels.

Franco Alhaique is professor emeritus at the University of Rome "La Sapienza", where he teaches pharmaceutical technology. His major research interests include polysaccharide hydrogels and vesicles for drug delivery. He serves on the editorial board of scientific journals and is co-editor of the *Journal of Drug Delivery Science and Technology*.

Tommasina Coviello obtained her PhD in chemistry from University of Rome "La Sapienza", where she is associate professor of pharmaceutical technology. Her research topics, which deal with the physical-chemical characterization of polysaccharides and of polymeric drug delivery systems, have been published in more than 80 papers in international journals.

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Polysaccharide Hydrogels

"The pursuit of science has often been compared to the scaling of mountains, high and not so high. But who amongst us can hope, even in imagination, to scale the Everest and reach its summit when the sky is blue and the air is still, and in the stillness of the air survey the entire Himalayan range in the dazzling white of the snow stretching to infinity? None of us can hope for a comparable vision of nature and of the universe around us. But there is nothing mean or lowly in standing in the valley below and awaiting the sun to rise over Kinchinjunga."

Truth and Beauty: Aesthetics and Motivations in Science (1987)
Subrahmanyan Chandrasekhar (Nobel Prize in Physics, 1983)

Preface

"What is a hydrogel?" "Sorry for taking your time Prof., but I need an explanation from you: what is the difference between a very viscous concentrated polymer solution and a hydrogel?" "Excuse me, I don't want to bother you, but I have also another question: how can I characterize a hydrogel?"

How many times polymer scientists, involved in the field of hydrogels, received these important and sometimes challenging questions? And how many times are we embarrassed while answering due to the difficulties in explaining the main features of this particular "state of matter" in a simple and straightforward manner?

"...the gel ...is easier to recognize than to define...". This is the famous statement that Dorothy Jordan Lloyd wrote in her book in 1926. Although since then much work has been carried out on hydrogels for their better characterization and definition, for many people and even for "experts" in this subject, this part of science still remains in the "dark side of the moon".

After a long scientific and professional activity, mainly devoted to polysaccharide hydrogel innovation, characterization, and evaluation of possible uses in the field of pharmaceutics and biomedical devices, we decided to summarize the state of the art in this discipline, trying, at the same time, to answer to the main questions that those who want to start a scientific approach to hydrogels and their applications in pharmacy and medicine must face.

The aim behind the preparation of this book is to offer students, scientists, and professionals a valid support that can help them find their way within the complex world of polysaccharide hydrogel characterization. In this book, we have selected topics, mainly related to the experimental aspects, that we encountered more

frequently during our various studies. At the same time, we were forced to leave out several aspects that could also be considered as important topics, but, as it happens in most of the events of our life, selections and exclusions are needed because of mandatory limitations such as the size of this book.

While preparing this book, we asked for the assistance of many of our friends whom we met over the years during our studies, sharing with them competencies and receiving knowledge and friendship. We thank all of them for their willingness.

We would also like to thank Dr. Claudia Cencetti for her invaluable work in text revision.

Finally, we would like to thank all the colleagues that helped us in directing our steps within this discipline, since the beginning and over the years. In this sense we would like to remember in particular Prof. Vittorio Crescenzi, a mentor and a group leader in this field. It was under his guidance that, enlightened by his knowledge, we discovered the fascinating world of polysaccharide hydrogels.

Pietro Matricardi
Franco Alhaique
Tommasina Coviello
Autumn 2015

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