

# Nano-Biomaterials For Ophthalmic Drug Delivery

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Anjali A. Hirani  
Editors

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 Springer

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*To the loving memories of my parents and Dr. Keshav Baliram Hedgewar, who gave a proper direction; my wife Seema, who gave a positive meaning; and my son Sarvadaman, who gave a golden lining to my life.*

Yashwant Pathak

*Dedicated to my mother and family. I have achieved much in my life because of their blessings.*

Vijaykumar Sutariya

*To my sister and parents for their love and support, my family in India for their prayers, and my mentors, Dr. Pathak and Dr. Sutariya, for being a beacon of light to help direct me to my goals.*

Anjali A. Hirani

## Foreword

A rapid expansion of new technologies in ocular drug delivery and new drug candidates, including biologics, to treat challenging diseases of the eye have recently emerged. These approaches are necessary because the eye has many unique barriers that block drug delivery. In the last decade, a significant growth in polymer science, nanotechnology, and biotechnology have been observed. This has led to the development of newly engineered nano-biomaterials, extensively explored as drug delivery carriers, implantable devices, and scaffolds.

This book is a collaborative effort of the editors Yashwant Pathak, Anjali Hirani, and Vijaykumar Sutariya as well as the numerous contributors who are leading scientists in this field. The subject matter is of prime importance in the area of nanotechnology and its application in ophthalmic drug delivery. All of the authors elucidate in their chapters, the potential interface between nanomaterials and the ophthalmic environment. This book presents a variety of nanomaterials and their applications in the treatment of ocular disease. I would like to commend Dr. Yashwant Pathak, Dr. Anjali Hirani, and Dr. Vijaykumar Sutariya at the University of South Florida for editing this important and timely issue.

It is my great pleasure to present to you *Nano-Biomaterials for Ophthalmic Drug Delivery*. I hope you will gain as much insight as I did from these chapters.



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# Preface

This book is edited with a focus on nano-biomaterials for ophthalmic drug delivery. In recent years, the development of different nano-biomaterials has given a boost to drug delivery systems, and many products approved by the US FDA are in the market. The application of these nano-biomaterials, especially in the area of ophthalmic drug delivery, is receiving significant attention from the scientific community. It really created a need for an extensive study of these materials and for an excellent reference book, as these topics were previously addressed in detail. We think this book will fill the gaps of the knowledge presently available and provide detailed coverage of the potential applications of nano-biomaterials in ophthalmic drug delivery.

We also tried to cover various assessment and characterization techniques that have been developed to evaluate systems in the ophthalmic environment. The safety of the interaction of nano-biomaterials in the physiological environment is a concern for the health community which has also been covered well in this edited volume.

This book is targeted toward academic institutions, especially those working in the field of polymeric materials for drug delivery and ophthalmic drug delivery systems. Additionally, this will be a useful resource for pharmaceutical, medical, and other healthcare professionals. We envision this book will be a reference material and resource for researchers investigating technology to update understanding of drug delivery systems for the eye.

The volume comprises 26 chapters written by leading scientists in this field. The first chapter covers an introduction to nanotechnology with a special reference to ophthalmology. The next section addresses the ophthalmic system from the physiological and pharmacological point of view.

The next group of chapters covers nanoscale materials and their applications in ophthalmic drug delivery, including implantable and non-implantable systems. This is followed by the assessment and characterization of nano systems. The final group of chapters covers nano safety concerns and solutions.

We sincerely hope this book will be well-received by the scientific communities in the fields of nanotechnology and ophthalmology.

Thanks and acknowledgments to our families, the publishers, and our contributing authors. A special thanks to Aum Solanki and Rohini Nimbalkar for their help in the final compilation. We would like to acknowledge Ms. Carolyn Honour and all the other staff at Springer who helped to create this wonderful contribution to the field of ophthalmic drug delivery.

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