

Preface

Nanotechnology has had a significant impact on the pharmaceutical sciences, as well as biomedical engineering in the last several decades. Among the wide range of nanocarrier systems that have been developed, solid lipid nanoparticle (SLN) has received consistent and increasing attention due to its distinctive set of biocompatibility, structural flexibility, and translatability. Since their invention as a substitute technology to conventional colloidal carriers, SLNs have become a fully-fledged platform with applications in drug delivery, diagnostics, cosmetics, and food technology among others.

Solid lipid nanoparticles have some strong advantages such as the physical and biodegradable lipids can be used, the active agent can be released in a controlled and targeted fashion, and they can be manufactured on a large scale. The ever-increasing improvement in lipid chemistry, formulation strategies and methods of analysis has greatly enlarged the design space of SLNs allowing fine control over particle size, polymorphism, surface functionality and drug-loading behavior. Simultaneously, the increasing regulatory consciousness and industry interest prominently reflects the necessity of an in-depth and critical approach to the principles and the real-life aspects of the rules that govern SLN-based systems.

The current edited book, *Solid Lipid Nanoparticles: Fundamentals, Design and Applications* has been envisioned as a comprehensive and authoritative reference to the researcher, graduate student, and professional working in nanomedicine, pharmaceutical sciences, materials science, and other related areas. The book comprises the works of prominent scholars in the academic and industrial sectors and presents balanced information about theoretical principles, formulation and characterization methodologies and new areas of application.

The first two chapters are devoted to the principles of solid lipid nanoparticles such as the history of their appearance, physicochemical principles, lipid polymorphism, and the processes of drug loading and

release. The following parts are devoted to formulation design and manufacturing methods, traditional and innovative production methods, surface modification methods, stability, and modern analysis tools. The second half of the book discusses a broad variety of uses, including oral, parenteral, pulmonary, ocular, and topical drug delivery, and also uses in cancer therapy, vaccine delivery, gene and nucleic acid delivery and non-pharmaceutical interests, such as cosmetics and nutraceuticals. The regulatory views, scale-up issues, and the future directions are also covered in order to narrow the gap between laboratory studies and practical implementation.

This book, by bringing together not only existing information but also the latest advances, will help to develop a more in-depth perception of solid lipid nanoparticles and encourage the innovative approach towards their rational design and use. Hopefully, this book will be not only a manual but also an inspiration in the process of further investigation and collaboration with other disciplines in this active and fast developing sphere.

All the authors of the chapters, the reviewers and the publishing team have been instrumental in the development of this book and therefore the editors are grateful to be able to have all their contributions to the book. We also hope that *Solid Lipid Nanoparticles: Fundamentals, Design and Applications* will make a significant contribution to the development of science, technology and education within the context of lipid-based nanocarriers.

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