

Preface

Rohan Shah, as a young Ph.D. student at Swinburne University, was intrigued by nanoparticles and what they can do for modern society. As a Graduate of Pharmacy, he was aware of many illnesses which can be cured by modern medicines, but he was also acutely aware that those medicines were often ineffectual in the real world because of deficiencies in their delivery system. This prompted Rohan to begin a Ph.D. studying his delivery system of choice—lipid nanoparticles. He soon became aware that there was no single book which gave a good, comprehensive, overview of lipid nanoparticles, their preparation and their characterisation. So, in collaboration with his major supervisors, he set out to write such a book.

The book aims to capture, in the one place, our current knowledge of lipid nanoparticles. It will appeal to all practitioners of science and medicine who have an interest in lipid nanoparticles—from fellow Ph.D. students to chemists working in formulations, to industry partners wanting an overview of lipid nanoparticles, to teachers and lecturers wanting information about lipid nanoparticles, all in one place. The book will also appeal to students, lecturers and researchers with a general interest in colloid science.

The book starts with an overview of lipid nanoparticles, their general structure, type and use. It then goes into more detail about the structure and composition of lipid nanoparticles. How they are made and their formulation complexities are discussed in detail, including the use (by the authors) of microwave technology. Characterisation techniques are introduced, many of which are general and have applicability to many areas of colloid and nanoscience. These include particle size, zeta potential, electron microscopy, crystallinity, polymorphism, thermal characteristics and drug loading capacity. The book gives an overview of these techniques, then detailed information about their application to lipid nanoparticles. Finally, stability is discussed in detail, both in terms of colloidal stability and the stability of drugs encapsulated within the lipid nanoparticles.

Most importantly, each section is thoroughly referenced so that the reader can investigate further those aspects they are most interested in.

The authors are well versed in the fields of colloid science, applied microbiology and formulation science. Mr. Rohan Shah has a degree in pharmacy and

a diploma in biotechnology with publications in the field of phytochemistry and colloid chemistry. The topic of his thesis, developing lipid nanoparticles for drug delivery, is ideally suited to the book. Dr. Daniel Eldridge is an enthusiastic young colloid scientist interested in formulation and with experience in the industrial formulation of liposomes for use in encapsulating skin penetrable medications. His other academic areas of interest primarily include metal adsorption processes and water chemistry. Professor Enzo Palombo has worked as a research microbiologist in the health and university sectors for over 20 years. He combines his research activities on gastrointestinal microbiota, food microbiology, environmental microbiology and bioactive compound discovery with his academic responsibilities in the areas of microbiology, virology, food safety and public health. Professor Ian Harding has over 30 years of experience in industrial colloid science; including waste treatment (he is co-inventor of the patented process of adsorbing colloid flotation for removal of aqueous materials from industrial waste); treatment of PET plastic to enable them to be recycled as a food grade product; minimisation of toxic organic solvents in paint manufacture; the use of biomass as an adsorbent for toxic heavy metals; and more recently the formulation of medicines to treat malaria and the development of biodegradable, thermoreversible polymer scaffolds for use in medicine. Professors Harding and Palombo have previously undertaken several collaborative projects including the formulation of solid lipid nanoparticles (topic of this book), risk assessment of colloidal material in drinking water, investigation of traditional medicinal plants for new drug sources and fungal degradation of industrial (including agricultural) waste.

We hope the book proves useful to other researchers interested in lipid nanoparticles and believe that it is an excellent starting reference for the preparation and characterisation techniques of lipid nanoparticle formulations.

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