The nanotechnology industry is a fast-growing industry with many unique characteristics. When bringing the results of nanotechnology research to the market, companies and universities run into unforeseen problems related to intellectual property rights and other legal and regulatory issues. An effective commercialization of the results of research requires basic knowledge of the relevant issues and a well-defined strategy, while the absence of such knowledge and strategy can be detrimental to the commercial potential of any invention. Even the most impressive scientific achievements can become a commercial failure because of a lack of understanding and strategy relating to the legal and regulatory issues surrounding the commercialization of a technology. This book discusses the most relevant issues that a company or university will face when bringing a nanotechnology invention to the market. A large part of the book is dedicated to the acquisition, strategic use, valuation, and licensing of patents. Further chapters deal with venture capital, university-industry collaboration, environment health and safety, and public perception.

In this way managers and scientists at universities and companies are provided with a handbook that provides them with industry-specific basic knowledge of issues that they are unfamiliar with but that is essential to the commercial success of their inventions.

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NANOTECHNOLOGY COMMERCIALIZATION FOR MANAGERS AND SCIENTISTS
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edited by WIM HELWEGEN LUCAESCOFFIER
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Foreword

Nanotechnology holds great promise for the future of humankind, and scientists and managers should be aware of this. Public and private sector investments in nanotech research have increased exponentially in the past two decades. We are now facing a future, not too far beyond the present, in which materials and devices with astonishing properties will completely change the rules of the game. Novel products will possess features that were almost unimaginable just a few years ago.

Until recently, universities and research centers around the world had been the prime actors in this developing revolution because nanotechnology research requires the skills of interdisciplinary teams that are most readily found in academia. What we are seeing today is a paradigm shift into the entrepreneurial arena. More and more pure researchers are getting involved in spinoff ventures that spring from the academic setting, and there is a need for interdisciplinary knowledge that combines scientific and managerial skills. At the same time, managers who expect to become involved in near-term nanotechnology enterprises require basic knowledge of the wide range of current applications in this fascinating field.

This book is a valuable attempt to satisfy these objectives. Authors with diverse backgrounds offer insight and useful advice both to scientists who may be seeking to capitalize their nanotech research through the creation of a new venture and to managers who need to know how and why this unique technology domain is regulated. The book focuses strongly on the creation and monetization of the intellectual property related to nanotechnology inventions, starting from the conception of the patentable idea and progressing through the venture capital stage.
and also nanotechnology regulation. The full pipeline of present-day nanotechnology is examined through the expert eyes of patent attorneys, professors, regulation experts, managers, and scientists, with helpful comparisons of IP issues in the United States and Europe.

I have found this volume to be very useful in my own work. Anyone who is interested in starting a nanotechnology-based venture or who wishes to understand how to manage one should read this book to become more aware of the opportunities and challenges that nanotechnology will bring into our lives.

Robert A. Freitas Jr.
Preface

Nanotechnology will have a large impact on our future, but a lot of research and development (R&D) projects have yet to be conducted. This R&D will require extraordinary efforts from individuals and groups in universities, research institutes, and the industry. Unfortunately, scientific genius does not always equal commercial success. In order to benefit commercially from one’s research, or even to prevent others from obstructing research, a myriad of factors need to be taken into account. Many of those, for example, environment, health and safety regulations, academy-industry cooperation, intellectual property, and attracting investments, come into play well before and during the research process. This book intends to provide the reader with the basics of the most relevant factors that need to be taken into account before, during, and after the R&D phase. Although some of the subjects discussed are highly complicated, the authors have written the chapters in a way that makes them understandable for professionals who are not familiar with the topic at hand.

The nanoscale brings many challenges to scientists who deal with it. Some of its unique characteristics also pose challenges in the process of commercialization. This book discusses these nanospecific challenges. While most chapters and parts of chapters are nano-specific, others are of a more general nature, either because a more general discussion is needed in order to understand the nano-specific part or because, despite not being nano-specific, they are essential in the commercialization process.

To provide our readers with the best possible information, we relied upon the expertise of a great and diverse team of authors: Joanna Brougher, Niklas Bruun, Rachel Buchanan, Bärbel Dorbeck-Jung, Michael Heintz, Kaarle Hämeri, Efrat Kasznik, Michael Landau,
Preface

Hanna Laurén, Claes Post, Sarah Rouse, Christine Smid, Marco Spadaro, Ennio Tasciotti, Pekka Valkonen, Pieter de Witte, and Po Chi Wu. We wish to extend our deepest gratitude to them for sharing their expertise and for their commitment and diligence during the entire process.

We are also very grateful to Stanford Chong, the publisher of this work, and to his editorial team for having made the realization of a book with so many authors a smooth and enjoyable experience.

Wim Helwegen and Luca Escoffier
Helsinki and Tokyo
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