The genesis of this volume came about when Lynnette was approached by the publisher to edit a book. The ensuing discussion between us led away from the publisher’s original suggestion to an idea that is a truly exciting one, to provide the reader with real-world examples on how new materials can play a key difference in our future and how those materials actually become part of a product. To many people it is unclear what is actually involved in this process. It might appear that a material expert gets an idea and moments later, there is a new product taking advantage of this improved material. This scenario is very far from the truth so much so that it forms part of the motivation for this book. In reality, the effort and the large number of iterations before an idea becomes a new product is not only significant but also very exciting, in essence, a story worth telling. This book is not printed as a collection of material that was already partially presented or described elsewhere that was simply in search for a home. Rather, each chapter was specifically tailored and written in the past year for this book “Materials Research for Manufacturing: An Industrial Perspective of Turning Materials into New Products” by materials scientists and engineers actively working in industry. To our knowledge there are very few comprehensive examples (or indeed collections of examples) published about working industrial processes where one can learn about the latest developments.

First and foremost, this book with its collection of edited chapters is written with the reader in mind; a reader that has asked her-/him-self exactly what has to happen in order to turn materials into new products in today’s industrial setting. This concept we felt should not be conveyed by academics, university researchers at the leading edge of materials research; rather, it should be written by the very materials experts working everyday at the industrial forefront. That said, universities are where the future materials scientists are created and as such, these universities and the materials research carried out there play a key role.

It is our hope that this book will be read by new and soon-to-be university and college graduates who will next turn their focus to industry and who are ready to address today’s challenges. As well, we believe that the book will interest industry
researchers in related fields and professors who are teaching advanced courses in manufacturing. Materials science and engineering is a very interdisciplinary field—it draws on knowledge from many disciplines (including physics, chemistry, and other branches of engineering). Through studying these current examples of today’s production processes, we expect that the readers will gain insights that help them to address other problems.

During the development of new materials to solve manufacturing problems, unexpected results emerge that have the potential to make further improvements in a product or enable completely new products. We believe that discoveries during the process of introducing new materials during manufacturing serve as key pillars of innovation that drives progress. As Lynnette and I talked about our image of the ideal book, it was clear that both large well-established companies with a long history of new materials and products should be sharing their examples alongside smaller more recently established companies. The thought processes of these two groups are identical in some respects, but differ in other ways, mainly due to the research capabilities in-house and the subsequent motivation to reach out to universities. We also wanted the book to deal with new and emerging areas such as graphene and the usage of nanocellulose. We wanted to explore recent materials progress made in well-known areas such as glass, superconductivity, and composites, and examine how modeling of materials were incorporated into such processes. The book also introduces the chapter authors that worked on these materials (with both their photographs and biographies) with the hope that it might inspire more to join the ranks in any future volumes.

In closing, I would like to specially thank:

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- Dr. Uma Chowdhry for the book’s Foreword.
- All the chapter authors for their contributions.

Happy reading—enjoy!

Falls Church, Virginia

Erik B. Svedberg
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