

## Preface

Carbon nanotubes (CNTs) have been standing among the most important materials in both scientific research and technical applications since 1990s. CNTs are composed of hexagonal  $sp^2$  carbon networks rolled up into cylinders. This unique structure endows them outstanding physical, mechanical, and chemical properties. For instance, CNTs are on the top list of superior materials in mechanical strength, electrical and thermal conductivity, as well as stability. In addition, the structure-dependent electronic and optical properties of single-walled CNTs (SWCNTs) bring great potentials in electronic and optoelectronic applications.

After 27 years' practice (since 1991) in both research and application, now it is a right time to summarize the existing knowledges, discuss the present challenges, and look forward to the future of CNTs. Therefore, we edit this book on these purposes. The book contains 11 chapters, covering topics on preparation, property and devices, application and industrialization. All the chapters are contributed by active researchers in the field. Since preparation is always the basis of materials research and application, so we put the preparation and characterization at the beginning. It starts from the theoretical study on the growth mechanism, then introduces catalysts for controlled growth, further extends to the growth of horizontally aligned SWCNT arrays and SWCNT films, and finishes with the sorting of SWCNTs. Subsequently, the optical and electronic properties are discussed. The application and industrialization part involves the applications in panel display, flexible electronics, and solar cells as well as the macro production and commercialization of CNTs.

CNTs have shown to be materials with great scientific importance and remarkable potentials in advanced applications. We believe this book can bring you comprehensive information on the progress and deep insight into the emerging future in this field. Finally, we would like to thank 'Strategic Partnerships Project' between The University of Tokyo and Peking University for kind support in our co-editing work.

Yan Li and Shigeo Maruyama

Peking University and The University of Tokyo

# Content

## Part I Preparation and Characterization

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