

# Preface

A dressed photon is a virtual photon that dresses material energy, specifically, the energy of an electron–hole pair, in nanometric space. A quarter of a century has passed since the author pioneered basic research on the dressed photon, and even 20 years have passed since he proposed nanophotonics, which is a novel optical technology exploiting the dressed photon. This technology, which is neither wave-optical technology nor materials technology but a mixture of the two, should be named “Light-Matter Fusion Technology.” Although the number of researchers engaged in this technology was quite small in its early stages, it has been rapidly increasing in recent years, and a number of related industries have been born.

In view of the rapid growth of this technical field, the purpose of this book is to disseminate the concepts of the dressed photon. First, [Chap. 1](#) surveys the topics to be discussed in this book. [Chapters 2–4](#) describe the fundamental concepts and theories of dressed photons, using a combination of concepts from optical science, quantum field theory, and condensed matter physics. In [Chaps. 5–8](#), several applications are reviewed. Since the technologies enabling these applications are rapidly progressing, it is recommended that readers refer to the original papers or review articles for details. Finally, [Chap. 9](#) summarizes the topics and presents a future outlook on the field. As supplementary material, Appendices A–H describe related topics and give detailed derivations of the equations appearing in this book.

During the course of establishing the fundamentals and developing applications of dressed photons, the author has gotten a lot of suggestions and comments from leading scientists in the relevant fields of research. Furthermore, fruitful discussions have been held with many young, active scientists, from whom the author has been greatly enlightened.

Since the dressed photon is now being applied to establish generic technologies for constructing infrastructures that will be needed for future society, this book will provide scientific and technical information about dressed photons to scientists, engineers, and students who are and will be engaged in this field.

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Several application technologies of dressed photons, reviewed in [Chaps. 5–8](#), were developed through academia–industry collaborations under arrangements made by the Specified Nonprofit Corporation “Nanophotonics Engineering Organization.” Finally, the author is grateful to Dr. C. Acheron of Springer–Verlag for his guidance and suggestions throughout the preparation of this book.

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Motoichi Ohtsu

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Ohtsu, M.

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