

SERIES EDITOR: AKHLESH LAKHTAKIA

OFF-SHELL APPLICATIONS IN NANOPHOTONICS

Dressed Photon Science and Technology

MOTOICHI OHTSU



NANOPHOTONICS SERIES

Contents

Author biography	ix
Foreword	xi
Preface	xiii
Acknowledgments	xv
Introduction	xvii
Chapter 1 History, current developments, and problems	1
1.1 Past and present	1
1.2 A link to novel theories	6
1.3 Strategies for novel theories	12
References	17
Chapter 2 Nature of the dressed photon	19
2.1 Creation, annihilation, and localization of the dressed photon	19
2.2 Spatial evolution of DP energy transfer	23
2.3 Temporal evolutions of DP energy transfer	30
2.4 Energy disturbance by measurement	36
References	39
Chapter 3 Nano-optical devices based on the nature of the dressed photon	41
3.1 Logic gates	43
3.2 Nano-optical condenser	50
3.3 Energy transmitter	52
3.4 Optical buffer memory	58
3.5 Signal converters and pulse generator	60

3.6 Superior performance levels and unique functionality of DP devices	64
References	67
Chapter 4 Nano-fabrication technology based on the nature of the dressed photon	71
4.1 Technology using a fiber probe or an aperture	71
4.2 Technology not using a fiber probe or an aperture	82
References	91
Chapter 5 Optical energy conversion based on the nature of the dressed photon	95
5.1 Conversion from optical to optical energy	95
5.2 Conversion from optical to electrical energy	111
References	116
Chapter 6 Light-emitting diodes, lasers, and relevant devices based on the nature of the dressed photon	119
6.1 Si-LEDs	119
6.2 Si lasers	125
6.3 Infrared Si-PDs with optical amplification	137
6.4 Polarization rotators	140
References	145
Chapter 7 Embarking on theoretical studies for off-shell science	149
7.1 Augmented Maxwell's theory	151
7.2 Theories having a mathematical basis	160
References	168
Appendix A: Present status of numerical simulation techniques and their problems	171
Appendix B: Supplementary explanations of the CD field	181
Suggested reading	187
Index	189