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Optical Microresonators

Theory, Fabrication, and Applications

 Springer

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Preface

In writing this book we sought to describe some of the important aspects and applications found in the wonderful world of optical microresonators. Of course we tell it from our respective points of view. These vantage points have been clearly biased by the specific roads we took during our investigations. We only hope that it does not detract from the ideas and information collected in this research monologue. We would never admit to perfection and cannot claim mathematical rigor in the theoretical chapters nor detailed process recipes in the chapter on fabrication. These circulating fields and their interactions have kept us busy and entertained both conceptually and in the lab for the better part of a decade. When we started out in this field, there was no textbook to consult. It is our hope that students and researchers entering this field now have such a guide.

We dedicate this effort to Erika, Priya, Rhea, Uma, Dalia, and Mariam.

Acknowledgments

John E. Heebner graduated first in his class with a B.E. in engineering physics from Stevens Institute of Technology, Hoboken, NJ, in 1996. He then conducted graduate studies at the Institute of Optics, University of Rochester, where he received a Ph.D. in optics in 2003. Dr. Heebner's doctoral research on the topic of nonlinear optical effects in microring resonators was carried out under the supervision of Prof. Robert W. Boyd. Much of the material for this book derives from those investigations supported by the National Science Foundation (NSF) and the Defense Advanced Research Projects Agency (DARPA). Dr. Heebner is currently employed as a Senior Optical Scientist by Lawrence Livermore National Laboratory in Livermore, CA.

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Rohit Grover completed his B.Tech. in engineering physics from the Indian Institute of Technology Bombay, Mumbai, in 1997. He then received both an M.S. and Ph.D. in electrical and computer engineering from the University of Maryland, College Park, in 1999 and 2004, respectively. Dr. Grover's research on semiconductor optical microresonators was carried out primarily at the Laboratory for Physical Sciences, College Park, MD. This book draws, in part, on Rohit's work while at the University of Maryland, where he received support from a Graduate Research Assistantship (1998-2000), Distinguished Graduate Research Assistantship (2000-2003), and an IEEE-LEOS Graduate Student Fellowship (2001). Dr. Grover is currently a Senior Process Integration Engineer at

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Tarek would like to thank the staff of the Laboratory for Physical Sciences. In particular, he thanks his advisors, Prof. J. Goldhar and Prof. Ping-Tong Ho, and his colleagues, Philippe Absil, Kuldeep Amarnath, John Hryniewicz, Rohit Grover, Vien Van, Ken Ritter, and Marshall Saylor. He also thanks his family for their support throughout his Ph.D. and during his professional life. He also thanks his advisor at Cairo University, Prof. Adel El-Nadi, for his great support and continuous encouragement.

Contents

Preface	v
Acknowledgements	vii
1. Introduction	1
1.1 Optical Microresonators	1
1.2 Historical Perspective	3
1.3 Putting the “Micro” in “Microring”	4
1.4 Nonlinear Optics in Microresonators	5
1.5 Book Overview	7
2. Optical Dielectric Waveguides	9
2.1 Total Internal Reflection and Waveguide Confinement	9
2.2 The Paraxial Waveguiding Equation	12
2.3 The Planar Slab Waveguide	13
2.3.1 TE Mode Profiles	13
2.3.2 TM Mode Profiles	15
2.3.3 Planar Waveguide Dispersion Relations	18
2.3.4 Normalized Planar Waveguide Dispersion Relations	19
2.4 Analysis Methods for Rectangular Dielectric Waveguides	20
2.4.1 Marcatili’s Method	22
2.4.2 Effective Index Method	23
2.4.3 Goell’s Circular Harmonic Method	24
2.4.4 Finite Element Method	25
2.4.5 Beam Propagation Method	25
2.4.6 Finite-Difference Time-Domain Method	26
2.5 Coupling	26
2.5.1 Perturbation Method for Deriving Coupling Coefficients	27
2.5.2 Coupling Between Symmetric TE Planar Waveguides	29
2.5.3 Coupled Wave Formalism	30
2.5.4 The Scattering Matrix	31
2.5.5 Optimized Coupling for Waveguides and Resonators	31
2.6 Bending Loss	36
2.7 Whispering Gallery Modes	38
2.7.1 TM Whispering Gallery Modes	39
2.7.2 TE Whispering Gallery Modes	41
2.7.3 Radiation Loss	42

2.7.4	WGM Dispersion Relations (Resonance Maps)	43
2.7.5	Normalized WGM Dispersion Relations (Resonance Maps)	46
2.7.6	Spheres, Rings, and Disks	48
2.8	Scattering Losses Resulting From Edge Roughness	50
2.8.1	Volume Current Method Formulation for Scattering Losses	50
2.8.2	Current Density Contributions	50
2.8.3	Spectral Density Formulation for Edge Roughness	52
2.8.4	Far-Field Scattered Power	53
2.8.5	TM Scattering Losses	55
2.8.6	TE Scattering Losses	56
2.8.7	Normalized Formulation for Edge Scattering Losses	61
2.9	Summary	70
3.	Optical Microresonator Theory	71
3.1	Resonator Fundamentals	71
3.1.1	Fabry-Perot Resonators	71
3.1.2	Gires-Tournois Resonators	73
3.1.3	Ring Resonators	73
3.2	All-Pass Ring Resonators	74
3.2.1	Intensity Buildup	75
3.2.2	Finesse \mathcal{F}	77
3.2.3	Effective Phase Shift	78
3.2.4	Group Delay and Group Delay Dispersion	79
3.2.5	Attenuation	83
3.3	Add-Drop Ring Resonators	84
3.3.1	Intensity Buildup	85
3.3.2	Add-Drop Resonance Width $\Delta\omega$ or $\Delta\lambda$	87
3.3.3	Free Spectral Range (FSR)	89
3.3.4	Finesse \mathcal{F}	89
3.4	More on Concepts Associated with Resonators	89
3.4.1	Quality Factor Q	89
3.4.2	Physical Significance of \mathcal{F} and Q	91
3.4.3	Phasor Representation	92
3.4.4	Kramers-Kronig Relations	94
3.5	Higher Order Filters	97
3.6	Summary	103
4.	Microring Filters: Experimental Results	105
4.1	Passive Resonators	105
4.1.1	GaAs-AlGaAs	107
4.1.2	GaInAsP-InP	107

4.2	Active Resonators	107
4.2.1	Electro-Optic Tuning	110
4.2.2	Material Characteristics	112
4.2.3	Tuning Measurements	116
4.3	Summary	121
5.	Nonlinear Optics with Microresonators	123
5.1	Nonlinear Susceptibility	123
5.2	Resonator Enhanced $\chi^{(3)}$ Nonlinear Effects	124
5.2.1	Enhanced Nonlinear Phase Shift	124
5.2.2	Nonlinear Pulsed Excitation	125
5.2.3	Kerr Effect in Solid State Materials below Mid-Gap	127
5.2.4	Experimental Enhancement of the Kerr Effect	128
5.2.5	Nonlinear Saturation	132
5.2.6	Multistability	136
5.2.7	Fabry-Perot, Add-Drop, and REMZ Switching	137
5.2.8	Reduced Nonlinear Enhancement via Attenuation	138
5.2.9	Nonlinear Figures of Merit (FOMs)	142
5.2.10	Inverted Effective Nonlinearity	144
5.3	Resonator-Enhanced Free Carrier Refraction	144
5.4	Enhanced Four-Wave Mixing Efficiency in Microring Resonators	147
5.5	Summary	148
6.	All-Optical Switching and Logic using Microresonators	149
6.1	All-Optical Switching	149
6.1.1	Theory	149
6.1.2	Linear Device Characteristics	151
6.1.3	Simulations	152
6.1.4	Nonlinear Device Characteristics	154
6.2	Thresholding and Pulse Reshaping	156
6.3	Time-Division Demultiplexing	158
6.3.1	Linear Device Characteristics	159
6.3.2	Nonlinear Device Characteristics	160
6.4	All-Optical Logic	163
6.4.1	AND/NAND	163
6.4.2	NOR	169
6.5	Summary	173
7.	Distributed Microresonator Systems	175
7.1	Introduction	175
7.2	Linear Propagation in Distributed Microresonators	175
7.2.1	Group Velocity Reduction	177

- 7.2.2 Group Velocity Dispersion 178
- 7.2.3 Higher Order Dispersion 179
- 7.3 Nonlinear Propagation in Distributed Microresonators.... 179
 - 7.3.1 SCISSOR Solitons 181
 - 7.3.2 Induced Self-Steepening 184
 - 7.3.3 Pulse Compression 185
 - 7.3.4 Nonlinear Detuning and Multistability 186
 - 7.3.5 Nonlinear Frequency Mixing 187
- 7.4 Limited Depth of Phase 189
- 7.5 Attenuation in Distributed Microresonators 190
- 7.6 Slow and Fast Light in SCISSORS 191
 - 7.6.1 Slow Light 192
 - 7.6.2 Tunable Optical Delay Lines 195
 - 7.6.3 Fast Light 197
- 7.7 Generalized Periodic Resonator Systems 197
 - 7.7.1 Bloch-Matrix Formalism 200
 - 7.7.2 Directly Coupled Resonators 202
 - 7.7.3 Single-Channel SCISSORS 204
 - 7.7.4 Double-Channel SCISSORS 206
 - 7.7.5 Twisted Double-Channel SCISSORS 208
 - 7.7.6 Bandgap Engineering in Distributed
Feedback Structures 210
 - 7.7.7 Slow Light, Group Velocity Dispersion,
and Nonlinearities 213
- 7.8 Summary 215
- 8. Fabrication Techniques for Microresonators 217**
 - 8.1 Materials 217
 - 8.2 III-V Semiconductors for Active and
Passive Microrings 218
 - 8.3 Growing a Waveguide Stack 219
 - 8.3.1 Polymers 219
 - 8.3.2 Glass 220
 - 8.3.3 III-V Semiconductors (InP and GaAs) 220
 - 8.3.4 Silicon Oxynitride 220
 - 8.4 Feature Definition 220
 - 8.4.1 Polymers, Glass, SiON, SiN 221
 - 8.4.2 III-V Semiconductors (InP and GaAs) 221
 - 8.5 Multilayer Processing 222
 - 8.6 Laterally Coupled III-V Passive Microresonators 225
 - 8.7 Polymer-Bonded, III-V Vertically Coupled
Passive Microresonators 227
 - 8.8 Active III-V Laterally Coupled Microresonators 234
 - 8.9 Other Configurations 238

8.10 Polymer Microrings	242
8.11 Summary	242
Bibliography	243
Index	261