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Nota di contenuto	Nanophotonic Materials; Contents; Preface; List of Contributors; I Linear and Non-linear Properties of Photonic Crystals; 1 Solitary Wave Formation in One-dimensional Photonic Crystals; 1.1 Introduction; 1.2 Variational Approach to the NLCME; 1.3 Radiation Losses; 1.4 Results; 1.5 Conclusions and Outlook; References; 2 Microscopic Analysis of the Optical and Electronic Properties of Semiconductor Photonic-Crystal Structures; 2.1 Introduction; 2.2 Theoretical Approach; 2.2.1 Spatially-Inhomogeneous Maxwell Equations in Semiconductor Photonic-Crystal Structures 2.2.1.1 Transverse Part: Self-Consistent Solution of the Maxwell Semiconductor Bloch Equations 2.2.1.2 Longitudinal Part: The Generalized Coulomb Interaction; 2.2.2 Hamiltonian Describing the

Material Dynamics; 2.2.3 Semiconductor Bloch Equations in Real Space; 2.2.3.1 Low-Intensity Limit; 2.3 Numerical Results; 2.3.1 Semiconductor Photonic-Crystal Structure; 2.3.2 Linear Excitonic Absorption; 2.3.3 Coherent Wave Packet Dynamics; 2.3.4 Wave Packet Dynamics with Dephasing and Relaxation; 2.3.5 Quasi-Equilibrium Absorption and Gain Spectra; 2.4 Summary; References

3 Functional 3D Photonic Films from Polymer Beads 3.1 Introduction; 3.2 Opals as Coloring Agents; 3.2.1 Opal Flakes as Effect Pigments in Clear Coatings; 3.2.2 Opaline Effect Pigments by Spray Induced Self-Assembly; 3.3 Loading of Opals with Highly Fluorescent Dyes; 3.4 New Properties Through Replication; 3.4.1 Increase of Refractive Index; 3.4.2 Robust Replica; 3.4.3 Inert Replica for Chemistry and Catalysis at High Temperatures; 3.5 Defect Incorporation into Opals; 3.5.1 Patterning of the Opal Itself; 3.5.2 Patterning of an Infiltrated Material; 3.5.3 Chemistry in Defect Layers; References

4 Bloch Modes and Group Velocity Delay in Coupled Resonator Chains 4.1 Introduction; 4.2 Experiment; 4.3 Coherent Cavity Field Coupling in One-Dimensional CROWS; 4.4 Mode Structure in Finite CROWS; 4.5 Slowing Down Light in CROWS; 4.6 Disorder and Detuning in CROWS; 4.7 Summary; References; 5 Coupled Nanopillar Waveguides: Optical Properties and Applications; 5.1 Introduction; 5.2 Dispersion Engineering; 5.2.1 Dispersion Tuning; 5.2.2 Coupled Mode Model; 5.3 Transmission Efficiency; 5.4 Aperiodic Nanopillar Waveguides; 5.5 Applications; 5.5.1 Directional Coupler; 5.5.2 Laser Resonators 5.6 Conclusion References; 6 Investigations on the Generation of Photonic Crystals using Two-Photon Polymerization (2PP) of Inorganic-Organic Hybrid Polymers with Ultra-Short Laser Pulses; 6.1 Introduction; 6.2 High-Refractive Index Inorganic-Organic Hybrid Polymers; 6.3 Multi-Photon Fabrication; 6.3.1 Experimental Setup; 6.3.2 Fabrication of PhC in Standard ORMOCER(®); 6.3.3 2PP of High Refractive Index Materials; 6.3.4 Patterning and PhC Fabrication in Positive Resist Material S1813; 6.4 Summary and Outlook; References

7 Ultra-low Refractive Index Mesoporous Substrates for Waveguide Structures

Sommario/riassunto

'Nanophotonic Materials - Photonic Crystals, Plasmonics, and Metamaterials' summarizes the work and results of a consortium consisting of more than 20 German research groups concentrated on photonics crystals research over the last seven years. Illustrated throughout in full color, the book provides an overview of these novel materials, spanning the entire range from fundamentals to applications.