



Optical Properties of Photonic Structures: Interplay of Order and Disorder (Series in Optics and Optoelectronics)

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The collection of articles in this book offers a penetrating shaft into the still burgeoning subject of light propagation and localization in photonic crystals and disordered media. While the subject has its origins in physics, it has broad significance and applicability in disciplines such as engineering, chemistry, mathematics, and medicine. Unlike other branches of physics, where the phenomena under consideration require extreme conditions of temperature, pressure, energy, or isolation from competing effects, the phenomena related to light localization survive under the most ordinary of conditions. This provides the science described in this book with broad applicability and vitality. However, the greatest challenge to the further development of this field is in the reliable and inexpensive synthesis of materials of the required composition, architecture and length scale, where the proper balance between order and disorder is realized. Similar challenges have been faced and overcome in fields such as semiconductor science and technology. The challenge of photonic crystal synthesis has inspired a variety of novel fabrication protocols such as self-assembly and optical interference lithography that offer much less expensive approaches than conventional semiconductor microlithography.

Once these challenges are fully met, it is likely that light propagation and localization in photonic microstructures will be at the heart of a 21st-century revolution in science and technology.

—From the Introduction, Sajeev John, University of Toronto, Ontario, Canada

One of the first books specifically focused on disorder in photonic structures, **Optical Properties of Photonic Structures: Interplay of Order and Disorder** explores how both order and disorder provide the key to the different regimes of light transport and to the systematic localization and trapping of light. Collecting contributions from leaders of research activity in the field, the book covers many important directions, methods, and approaches. It describes various one-, two-, and three-dimensional structures, including opals, aperiodic Fibonacci-type photonic structures, photonic amorphous structures, photonic glasses, Lévy glasses, and hypersonic, magnetophotonic, and plasmonic–photonic crystals with nanocavities, quantum dots, and lasing action. The book also addresses practical applications in areas such as optical communications, optical computing, laser surgery, and energy.

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