

Preface

The advances in experimental and applied photonics are connected with the rising potential of modern fabrication techniques, allowing the creation of tiny artificial structures with characteristic lengths (periodicity) comparable to or even smaller than the wavelength of light. Theoretical developments in this field have advanced apace and consisted to a considerable degree of the translation or mapping of wave phenomena from the quantum theory of solids into electrodynamics. This mapping has led to the appearance of theories of photonic crystals, light diffusion, backscattering and Anderson localization of light. Among the representatives of photonic crystals is their remarkable extension to magneto-optic systems, the subject of the current volume, magnetophotonic crystals. Pioneering studies on magnetophotonic crystals were motivated by fundamental and practical interests to enhance or take advantage of the magneto-optical response in existing magneto-optical materials and the possibility of controlling the flow of light by external magnetic fields.

When the constitutive elements of periodic media are magnetic, the resultant magnetophotonic crystals demonstrate unique optical and magneto-optical properties. For such magnetic, nonreciprocal media, there exists an additional degree of freedom to operate the photonic band structure, diffraction patterns, and the state of polarization of light—all these characteristics can be controlled by external magnetic fields. We believe that this volume will be a timely contribution to the development of this field by delivering results of many efforts devoted to experimental and theoretical studies of the magnetophotonic crystals and their applications.

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