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High Contrast Metastructures

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Introduction

Optical structures that are on the order of optical wavelength have been used to change the optical properties of the structures, similar to the use of nanostructures for quantization of electron wave. Recently, a new class of single planar layer subwavelength metastructures has emerged. The new metastructures are dielectric gratings with a large index contrast that can be designed to exhibit many extraordinary properties. For example, high contrast gratings (HCG) can provide very high reflection over a broad spectral range for light propagating in the direction orthogonal to the periodicity. It can also be designed to be a resonator with an extremely high quality factor and with user-friendly surface-normal coupling. Furthermore, changing the grating dimension individually, an ultra-thin lens or focusing reflector with high focusing power can be obtained.

This conference is the first one devoted to this theme. The presentations include a wide range of exciting advances, ranging from new physics, theories, to device applications. Various materials and fabrication technologies were used as basic platforms. In these proceedings, the readers will find discussion of novel direction selective filter elements, deep ultraviolet (DUV) polarizer and low noise infrared-mirrors. HCG designs to provide spatial mode filtering for mode control of VCSELs and wave-front-engineered mirrors are discussed. Phase engineering using HCG are explored in surface-normal transmission for solar cell concentrator optics and spiral lens applications. Using it at a glancing angle for hollow core waveguide, slow light waveguides are demonstrated. In addition, dynamically tunable all-pass filter array for fast optical beam steering is also presented.

During and post conference, we received much positive feedback and encouragement from attendees and presenters. There is a genuine sense of excitement and enthusiasm about this topic, as evinced by the full-house attendance and lively question/answer sessions after each talk. We are grateful to all the attendees for asking so many valuable questions. As always, the primary ingredient for a successful technical conference is the quality of the work presented by the contributors, so we would like to extend a special thanks to all the contributors for the quality of their presentations, and their eagerness to share new information and discuss different points of view. We would like also to express our gratitude to all keynote and invited speakers for presenting exceptional overviews and igniting thought-provoking discussions. We are grateful to the committee members and session chairs, as their support and dedication before

and during the event had a significant impact on the outcome and success of the meeting.

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