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Photon sorting using metasurfaces and nanoplasmonics

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Abstract

Metamaterials and nanoplasmonic/photonic crystals can perform photon sorting, light channeling and localization that allows a single layer composite structure consisting of a checker-board array with each square or unit cell of the array containing two different apertures, grooves or other light harvesting structures. Light that is incident upon the structure is split and sorted into the different spectral bands, and subsequently channeled to different structures where it is absorbed, measured or otherwise processed. Our work to develop and use photon sorting metasurfaces and plasmonics for different applications in the visible, infrared and microwave spectral regions will be described. Photon sorting for improved solar cell electrical contacts, for dual-wavelength infrared detection, and for polarimetric sensing will be described. The design, fabrication and experimental results in the visible and microwave spectral regions will be described.

Biography

David Crouse received a BS in Honors Physics from Purdue University and a Ph.D. in Electrical Engineering at Cornell University in 2002. He is an associate professor in the Department of Electrical Engineering at The City University of New York, Director of the Center for Advanced Technology in Photonics Applications, Director of the Center for Metamaterials (an NSF Industry/University Cooperative Research Center), and founder and Senior Technical Advisor of Phoebus Optoelectronics LLC. His research interests include fundamental and applied research on plasmonics crystals, metamaterials and nanotechnology and he has published over 50 papers and conference proceedings on the topics.