Docket #: S99-127

Method for Dispersing Light Using Multilayered Structures

Stanford researchers have invented a novel method and device for separating light of differing wavelengths. This method uses a very simple and compact multilayer dielectric structure having high angular dispersion at certain wavelengths and angles of incidence. The structure is composed of alternating layers of dielectric materials of different refractive indices, and is designed to operate just outside the main reflection. In this region, there is strong group velocity dispersion, causing different wavelength of light to travel at different angles through the dielectric stack. As a consequence, different wavelength components of a polychromatic beam are separated as they pass through the device. This device can also operate as a multiplexer by simply reversing the direction of the light.

Applications

- Optical communications
- Optical wavelength multiplexing and de-multiplexing
- WDM - spatially separating and/or combining component wavelength beams in wavelength division multiplexing (WDM) optical communication

Advantages

- The device can operate with light entering and/or exiting the substrate
- The device comprises of anti-reflective and reflective coatings to attain high optical efficiency and to increase spatial separation of the wavelengths of light
- The device can also operate as a multiplexer
- The device is very compact, inexpensive to fabricate, and made from readily available materials

Publications

- B. E. Nelson, M. Gerken, D. A. B. Miller, R. Piestun, C. C. Lin, and J. S. Harris, "Wavelength Division Multiplexing by Beam Shifting Using a Dielectric Stack as a One-Dimensional Photonic Crystal," *IEEE Lasers and Electro-Optics Society* 2000 Annual Meeting, Rio Grande, Puerto Rico (November 13-16, 2000). Paper WJ4.
- B. E. Nelson, M. Gerken, D. A. B. Miller, R. Piestun, C.-C. Lin, J. S. Harris, Jr., "Use of a dielectric stack as a one-dimensional photonic crystal for wavelength demultiplexing by beam shifting," *Opt. Lett.* 25/20, (2000) 1502-1504.

Licensing Contact

Luis Mejia

Senior Licensing Manager, Physical Sciences

Email