BROAD BANDWIDTH AND HIGHLY REFLECTIVE GRATINGS

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ABSTRACT

Broadband mirrors with very high reflectivity are essential for applications such as telecommunications, surveillance, sensors and imaging. Among the various conventional mirror designs, metal mirrors have larger reflection bandwidths but lower reflectivities; as a result they are not suitable for fabricating transmission-type optical devices such as etalon filters. Dielectric distributed Bragg reflectors (DBRs) can achieve a higher reflectivity but deposition methods for DBRs are often not precise enough to yield the reflectivities of 99% or better needed for demanding applications, and typical material combinations constrain the mirror bandwidth and can be incompatible with conventional semiconductor processing technologies. In addition the tuning range is often limited for tunable etalon type devices such as MEM vertical cavity surface emitting lasers (VCSELs), filters, and detectors. There is a need for a mirror with broadband reflection, low loss, and compatibility with conventional optoelectronic processing methods.

Researchers at the UC Berkeley have developed a single layer, sub-wavelength grating with a very broad reflection spectrum and very high reflectivity. The grating design facilitates monolithic integration of optoelectronic devices at a wide range of wavelengths from visible to far infrared, as well as integration with electronic circuits and other optoelectronic devices. Grating spectral characteristics can be tailored by choice of materials and structure to maximize both reflectivity and spectral coverage. The grating design developed at Berkeley has potential application in MEM tunable devices and reconfigurable focal plane arrays for such high value applications as optical communications, chemical/biological sensors, and imaging.

APPLICATIONS

Optical telecommunications, Chemical and Biological Sensors, Imaging and Surveillance

ADVANTAGES

Broad reflection spectrum with very high reflectivity; Scalable for wavelengths from visible to far infrared; and Compatible with conventional optoelectronic processing methods

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	8,189,643	05/29/2012	2004-004
United States Of America	Issued Patent	8,059,690	11/15/2011	2004-004
United States Of America	Issued Patent	7,304,781	12/04/2007	2004-004

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OTHER INFORMATION

KEYWORDS

wireless: system, communications, wireless, sensors, optical, networking, optics

CATEGORIZED AS

- » **Communications**
  - » Networking
  - » Optical
- » **Materials & Chemicals**
  - » Other
- » **Optics and Photonics**
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- » **Semiconductors**
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  - » Other

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