Optics-2013
OMICS Group Conferences
Accelerating Scientific Discovery
International Conference and Exhibition on
Lasers, Optics & Photonics
October 7-9, 2013 Hilton San Antonio Airport, USA

Flexible micro-cavity lasers and optical curvature sensor

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Abstract

In this talk, we will discuss the flexible InGaAsP micro-cavity lasers operated, and a chip-scale optical curvature sensor with the compact flexible lasers. Compact microdisk and photonic crystal cavities were fabricated on a Polydimethylsiloxane (PDMS) substrate. The lasing of the flexible compact cavities was achieved with a low threshold power around 1550 nm wavelength.

The lasing wavelength fine tuning of the flexible microdisk and photonic crystal lasers were also demonstrated by bending the micro-cavities from flat to 10 mm bending radius. The lasing wavelength shift is attributed to cavity distortion. A good agreement between experiment and modeling was also obtained.

We also demonstrated a compact optical curvature sensor with the flexible microdisk laser. The curvature dependence of lasing wavelength was characterized by bending the cavity at different bending radii. The measurements showed that the lasing wavelength decreases monotonously with an increasing bending curvature. The sensitivity of the compact device to the bending curvature is approximately 23.7 nm/mm from the experiment.

Biography

Min-Hsiung Shih received Ph.D. degree in electrical engineering/electrophysics from University of Southern California (USC), Los Angeles, USA in 2006. Currently he is an Associate Research Fellow in the Research Center for Applied Sciences (RCAS), Academia Sinica and an Adjunct Associate Professor in department of Photonics, National Chiao Tung University (NCTU), Taiwan. His research interests include integrated photonic circuits, photonic crystals, GaN based lasers, surface plasmonics, and cavity quantum electrodynamics. Dr. Shih is a member of the Institute of Electrical and Electronics Engineers (IEEE) and the Optical Society of America (OSA).