1060 nm and 1310 nm Vernier-Tuned Distributed Bragg Reflector (VT-DBR) Lasers for Swept-Source OCT

Abstract

The electrical and spectral characteristics of two VT-DBR lasers are presented. We report the first wavelength-tunable 1060 nm VT-DBR laser for use in SS-OCT applications. Electrical measurements demonstrate 1-3 nanosecond step-response times for wavelength tuning. Optical line-widths less than 10 MHz are measured using self-heterodyne interferometry.

Introduction to VT-DBR Lasers

Vernier-Tuned Distributed Bragg Reflectors (VT-DBR) lasers have recently been demonstrated at center wavelengths of 1310 nm and 1550 nm in swept-wavelength applications such as Optical Coherence Tomography (OCT), spectroscopy, and remote sensing [1]. In this paper we present the first electrically-tuned single-chip 1060 nm VT-DBR for applications in OCT. The VT-DBR laser has five semiconductor sections in a phase structure using the usual material system. The front mirror and back mirror sections enable coarse wavelength selection using the Vernier tuning effect [2]. The phase section allows fine wavelength tuning. The gain section provides optical amplification for the laser. The Semiconductor Optical Amplifier (SOA) section amplifies the output for shaping of the power profile across the tuning range of the laser to a flat, Gaussian, or custom power profile.

Electrical Characterization

Spectral Characterization

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