Monolithically Integrated, Widely-Tunable, Lasers
(Invited)

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Tunable lasers are poised to dominate most applications areas within the next few years. Widely-tunable monolithic DBR lasers have the capability to satisfy the requirements of nearly every application area. This presentation will describe the activities to realize this goal.
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While tunable lasers have been a focus of research and development efforts for over 10 years, they have only recently gained market acceptance in optical transport and networking. Tunable lasers offer many compelling advantages over fixed wavelength solutions in optical networks in that they reduce inventories, allow dynamic wavelength provisioning, and simplify network control software. More interesting, is that tunable lasers have been featured in optical network development efforts in every segment: access/enterprise[1], metropolitan[2], and long haul[3] networks leading to a variety of desired specifications and approaches. In fact, the term “tunable laser” has come to describe an increasingly broad range of technologies from monolithic semiconductor lasers, to MEMS (Micro-Electro-Mechanical Systems) based lasers and fiber lasers. This presentation will focus on monolithic, widely-tunable lasers which are promising candidates to satisfy the needs of all the market segments mentioned.

Simultaneously meeting the desired specifications for each segment would require a tunable laser with: high output power (>10 mW)[4], wide tuning range (>32 nm)[5], rapid wavelength tuning (< 10 ns)[6] direct or integrated modulation (≥ 2.5 GB/s)[3,5], high reliability (> 20 year MTTF)[7], and high volume production. The widely tunable, SG-DBR (Sampled Grating Distributed Bragg Reflector), laser is the only technology that has been shown to deliver on each of these areas, as the references indicate. Furthermore, this technology platform is suitable for further integration (for example, with semiconductor optical amplifiers[8] and electro-absorption modulators[5]) making it very attractive for future components with even higher levels of integration.

Obviously, challenges yet remain for this technology to establish a leading position among tunable lasers and most of the effort is focused on the following areas: output power, wavelength control, and high volume manufacturing. This, talk will report on the advances in these areas.

References