Widely Tunable Lasers for future WDM networks

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During the past years two new types of widely tunable laser structures that can be used in future telecom networks were designed and fabricated within the European IST project NEWTON.

A widely tunable twin-guide laser is a type of quarter-wave-shifted DFB laser. Current injection into the tuning layer is used to change the effective refractive index and the Vernier effect creates tuning over a wide wavelength range (several tens of nm). Both reflectors have a slightly different peak spacing so the frequency where both peaks overlap will reach the laser threshold first. By tuning one reflector, the reflection spectrum will move to lower wavelengths and the overlapping peaks will occur at a higher frequency. Due to the vertical integration of active and tuning sections, a phase tuning section, which is usually required to adjust the cavity mode position in longitudinally integrated devices, is not necessary. Therefore only two tuning currents are required to obtain full wavelength coverage over a wide tuning range, which makes the characterisation substantially less time consuming. With a tuning range of 30nm and a side mode suppression of more than 30dB the first batch of fabricated lasers looks promising. Further research and development is currently carried out to obtain full wavelength coverage.

The two reflectors are on the same side in the widely tunable modulated grating Y laser concept and the additive Vernier effect is used to select one lasing frequency. A higher side mode suppression can be obtained than with the multiplicative Vernier effect (e.g. used with the SSG-DBR laser), because the neighboring peaks add partly out of phase. With measured characteristics such as a 40nm tuning range, a side mode suppression of more than 40dB and a high output power this design has the same qualities as non-tunable lasers. Its wide tunability makes it possible to add extra flexibility, functionality and performance to the network.

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