

Trends and opportunities in high power Vertical External Cavity Surface Emitting Semiconductor Lasers (VECSEL)

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Abstract

In the past few years vertical external cavity surface emitting lasers (VECSEL) have proven to be reliable high-power laser sources due to their capability to produce high brightness, tunable outputs with coherent light generation. Large area optical pumping in conjunction with the external cavity design allows for excellent beam quality in a simple, compact, and flexible set-up. By semiconductor bandgap engineering a wide range of operating wavelengths in the near-IR have been demonstrated. Having access to the very high intracavity circulating power provides unique functionalities such as single frequency, wavelength tuning and efficient nonlinear frequency conversion. Tunable multi-watt cw output in the visible (blue, green or yellow) has been generated. Recently significant interest has been given to two-color generation as a mean to generate new wavelengths by sum or difference frequency. Two-color wavelength generation with intra-cavity circulating power of 100s of watts as the fundamental colors can provide unique opportunities in generating new wavelengths not easily achievable. In this talk I will review the recent progress in VECSELs. I will then present our new approach and recent results in generating multi-watts two-color in a T-cavity two-chip VECSEL configuration. Wide wavelength tuning of orthogonally polarized two-color emission will be reported. High power blue-green by intracavity sum-frequency generation will be shown. Future trends toward new wavelengths generation and their application opportunities will be discussed.

Biography

Mahmoud Fallahi received his Ph.D. degree from the University of Paul Sabatier and LAAS-CNRS in Toulouse, France in 1988. He was with the National Research Council of Canada first as a research associate and then as a research officer, a member of technical staff. He joined the Optical Sciences at the University of Arizona in 1995. He is currently a Professor at the College of Optical Sciences, University of Arizona. He has served as Conference Chair and Program Committee member in several international conferences.