

VCSEL Photonics for Communications and 3D Sensing

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Abstract

A vertical cavity surface emitting laser (VCSEL) was invented in 1977. The 40 years' research and developments opened up various applications including datacom, sensors, optical interconnects, spectroscopy, optical storages, printers, laser displays, laser radar, atomic clock and high-power sources. A lot of unique features have been proven. The market of VCSELs has been growing up rapidly and they are now key devices in data center networks. High speed VCSELs are attracting much attention for rapid growth in network traffics. Also, 3D sensing has been accelerating the VCSEL market for a wide range of applications such as face ID in mobile phones, LiDAR for automatic driving cars, distance sensor of robot, security camera, and motion sensors in virtual reality.

In this talk, the advances on VCSEL photonics will be reviewed, including the brief history of VCSELs, state-of-the-art performances and their applications. Our recent activities on new functions and integration of VCSEL photonics are also presented. We address a lateral integration platform and new functions, including high speed VCSELs for datacenter networks and edge computing, and high power VCSEL amplifiers/high-resolution beam scanners for optical sensing.

