

Vertical integration of an Electro-Absorption Modulator on a VCSEL to reach very high modulation speed

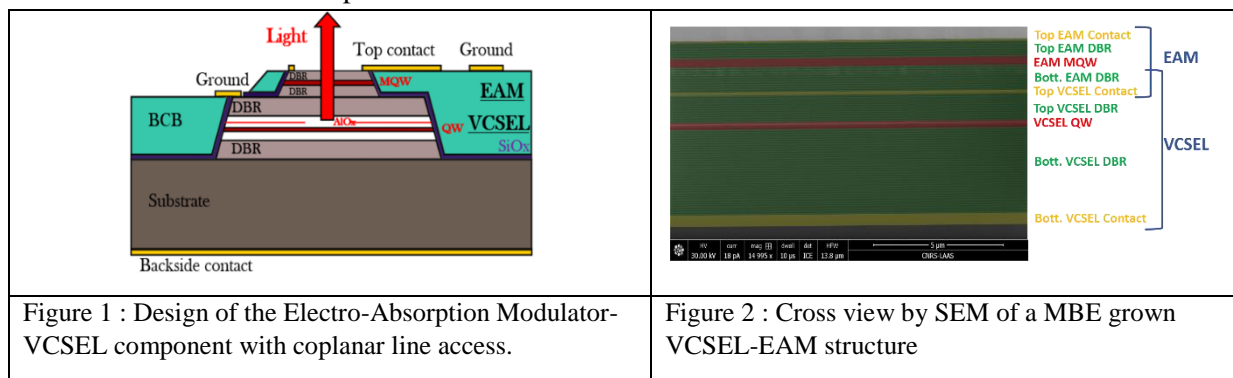
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The ever-increasing exchange of information translates in a need to develop transmitters presenting increasing modulation capabilities. To-date, the main research strand has aimed to increase the modulation bandwidth of directly-modulated VCSELs essentially through an improvement of their design [1,2]. However, the physical limits due to the carrier dynamics have to be overcome to enable the IEEE 802.3ba standards (100Gbps) to be met. To that extent, coupled-cavity (CC-) VCSEL configurations have been introduced with either lateral coupling [3], or vertically-coupled structures exploiting either electro-optic [4] or electro-absorptive effect to induce the modulation [5]. We worked on the optical design and simulations of Electro-Absorption Modulator vertically integrated with a VCSEL. We have grown different structures, EAMs and EAM-VCSELs, under close in-situ monitoring and with detailed characterization of the resulting epilayers. Preliminary static measurements of the devices subsequently fabricated using a self-aligned process [6] have shown very promising results and on a par with the literature state-of-the-art performance [7]. In Addition, we have also improved our high frequency contact design to decrease the pad capacitance and thereby facilitate wide bandwidth operation.



References

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