Advances in Quantum Dot Lasers for Silicon Photonics

(Invited paper)

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ABSTRACT

High temperature stability and high feedback-noise tolerance of the quantum dot lasers are advantageous features for silicon photonics. In this paper, we discuss recent progresses in quantum dot laser on silicon substrates. A silicon optical interposer incorporating InAs/GaAs quantum dot laser arrays via a flip-chip bonding method was demonstrated with the bandwidth-density of 15Tbps/cm^2 at 125 °C. In addition, we report the first demonstration of a hybrid silicon quantum dot laser, evanescently coupled to a silicon waveguide. InAs/GaAs quantum laser structures are transferred, by means of direct wafer bonding, onto silicon waveguides defining cavities with adiabatic taper structures and distributed Bragg reflectors. Lasing operation has been realized above 100°C . Finally, we show an InAs/GaAs quantum dot laser directly grown on Si on-axis (100) substrate by the molecular beam epitaxy.

Keywords: quantum dot lasers, silicon photonics, integrated photonics, molecular beam epitaxy

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