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A GaInAsP/InP Vertical Cavity Surface Emitting Laser for 1.5 μ m operation

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Abstract: We present the results of our studies concerning the pulsed operation of a bulk GaInAsP/InP vertical cavity surface emitting laser (VCSEL). The device is tailored to emit at around 1.5 μ m at room temperature. The structure has a 45 period n-doped GaInAsP/InP bottom distributed Bragg reflector (DBR), and a 4 period Si/Al₂O₃ dielectric top reflector defining a 3- μ m cavity. Electroluminescence from a 16 μ m diameter top window was measured in the pulsed injection mode. Spectral measurements were recorded in the temperature range between 125K and 240K. Polarisation, lasing threshold current and linewidth measurements were also carried out at the same temperatures. The threshold current density has a broad minimum at temperatures between 170K and 190K, ($J_{th}=13.2$ kA/cm²), indicating a good match between the gain and the cavity resonance in this temperature range. Maximum emitted power from the VCSEL is 0.18 mW at 180K.

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