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INGAN BLUE VERTICAL EXTERNAL CAVITY SURFACE EMITTING LASER

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Visible Vertical External Cavity Surface-Emitting Lasers (VECSELs) has recently been being considered as a strong candidate for light source of Laser Display. We have demonstrated a InGaN-based Blue Vertical External Cavity Surface-Emitting laser (VECSEL) in microchip type structure. The laser was optically pumped and operated at room temperature. The VECSEL device consisted of a sapphire substrate as well as a GaN epilayer, and has an integrated microlens on one side. The whole cavity formed a plano-concave cavity and high reflection dielectric mirrors were deposited on both sides of the laser cavity. The VECSEL device lased at a threshold excitation intensity of 379 μJ/pulse. In contrast to a conventional microcavity-VCSEL structure, the VECSEL operated in multiple longitudinal and transverse modes with a mode spacing consistent with its physical thickness. We have investigated the microlense effects on the VECSEL operation. Threshold excitation energy was lowest while slope efficiency was largest at optimum curvature radius of microlense. Furthermore, no mode hopping was observed and the laser was operated predominantly in single longitudinal mode. The existence of the optimum curvature radius is attributed to a combined effect of a reduced light leak in the lateral direction and a rapidly decreased gain area in active medium.