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## Development and Realization of Communication Semiconductor Lasers

With the ambient temperature continuous operation of the GaAs semiconductor laser in 1970 as a turning point, studies on communication semiconductor lasers had been actively carried out along with the development of the loss reduction/dispersion control of optical fiber. I. Hayashi, et al., realized laser oscillation using double heterostructure, and then examined the degradation mechanism toward its practical realization and received a footing for its long life. K. Shirahata, et al., developed the transverse junction stripe (TJS), stabilized transverse mode, for the first time. T. Tsukada, et al., proposed the built-in heterostructure and realized it, thereby showing the basic structure for communication lasers. Also, T. Ikegami, et al., picked out problems in long-distance communication with direct modulation and clarified the importance of the single-longitudinal-mode laser. K. Kobayashi, et al., started the development of the feedback semiconductor laser as a prospective structure for single-longitudinal-mode lasers and realized stable behavior with high-speed modulation in Gbit/s band. Further, aiming for long distance communication, semiconductor lasers which are able to operate in the 1.55μm band, and ultralow loss wavelength bands of silica-based fiber, were developed. From the latter half of the 1980s, super-thin film semiconductor crystal growth technology progressed, and then studies for achieving excellent properties by employing the quantum well structure were developed. By introducing the quantum well structure into the active layer part which converts power into lights, the reduction of threshold currents and increase in light output efficiency were achieved, and thereby power consumption to get the required light output was remarkably reduced and fast modulation properties improved considerably as well. In the 2000s, laser developments employing InGaAIAs having excellent temperature properties were carried out toward low power consumption and speeding up behaviors in the high-temperature range higher than ambient temperature.