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Pioneering Study on Surface-emitting Semiconductor Lasers

For semiconductor lasers, at first edge emitting type lasers with lights emitted parallel to the substrate were developed. However, K. Iga proposed a surface-emitting laser, emitting lights were emitted at right angles to the substrate and realized laser oscillation. This surface emitting laser had excellent properties, e.g., could integrate many elements two-dimensionally, had an extremely low operational threshold, and single wavelength operation. Consequently, it has been used for many fields, including laser mouses, high-definition color printers, 3D sensors in addition to short-distance optical LANs and light sources for optical interconnector.

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Pioneering Study on Blue Light Emitting Diodes

Studies on light emitting diodes started from the 1950s and in the 1960s red and greenish yellow color diodes were already developed. If blue light emitting diodes were to be realized, the three primary colors would be complete. This would allow many prospective applications such as displays, and thus this was hoped for by industry. However, it has been difficult to improve the crystal quality of gallium nitride, which is a semiconductor material capable of emitting blue light. I. Akasaki, H. Amano, S. Nakamura, et al., dramatically improved the crystal quality and made it possible to realize a super luminosity blue light emitting diode, having a significant impact on industries such as semiconductor illumination.