Defect And Stress Control Of Algan And Fabrication Of High Performance UV Light Emitters

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Currently, one of the hottest topics in the electronics industry in Japan is digitized terrestrial broadcasting. The bit rate of the digitized “high-vision” broadcasting is 24 Mbps, which is about six times faster than that of conventional analog broadcasting. Therefore, a storage system with a much higher capacity and higher transfer rate is necessary. Such a high specification storage system with easy handling of the storage media can be achieved by using nitride-based violet LDs or even a much shorter wavelength UV LDs. UV LDs will be also applicable to biomedicine, sterilization, lithography, laser-induced fluorescence spectroscopy, chemical reaction control, prototyping, drilling, optical storage, excitation of phosphors and catalysts, etc.

It is clear that solid state LED lighting has the advantages over light bulbs on several points. For example, the electrical circuit of the power supply is very simple and has high efficiency. Direct modulation is also possible. Therefore, the LED lighting system can be applied in optical communications. One of the most useful applications of the LED lighting system would be the provision of lighting in mobile systems such as cars, ships, trains, airplanes and spaceships. An LED system may function as both a lighting and communication system. As for the display applications, small size displays such as back light of the cellular phones and huge size displays in the stadium and billboard have been already achieved. So, next target will be the middle size displays. In order to achieve cost effective and high performance middle size displays, white LEDs with high efficiency and high color rendering is essential. Combination of UV LEDs with multi color phosphors are the most promising method to achieve high-efficiency and high color rendering white LEDs. Several attempts have been made to achieve high-efficiency UV LEDs. At the moment, however, all the report showed that the efficiency of UV LEDs decreases with shortening the emission wavelength. The aim of this work is clarify the factors which limit the performance of the UV LEDs. We will also discuss the shortest wavelength laser diode which we can fabricate by group III nitrides.