LD-6-2

Cw operation of an AlGaInP DH laser diode at 77 K grown by atmospheric MOCVD

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Cw operation of AlGaInP DH laser diodes was achieved for the first time at 77 K. The device was made from a DH wafer grown by conventional atmospheric MOCVD.

The DH structure consists of five layers on a (100)GaAs substrate as shown in Fig.1. The wafer was grown in a cold wall horizontal reactor at 600°C using TEA, TEG, TEI and PH_3 as source materials.

We have achieved cw operation at 77 K for the devices fabricated from the wafer. The devices had an 8 µm-wide and 250 µm-long stripe geometry made by Si_3N_4 insulation. A typical L-I curve is shown in Fig.2. The threshold current of the device is 55 mA, and the differential quantum efficiency is about 20 %. No kinks are observed up to 4 mW/facet. The diode was lasing at a wavelength of about 653 nm as shown in Fig.3. The lowest threshold current obtained was 47 mA, which corresponds to a threshold current density of 2.4 KA/cm^2.

The lowest pulsed threshold current density at room temperature was 15 KA/cm^2. The characteristic temperature, T_o, ranged between 99 and 130 K. Laser operation at temperature as high as 60°C was obtained.

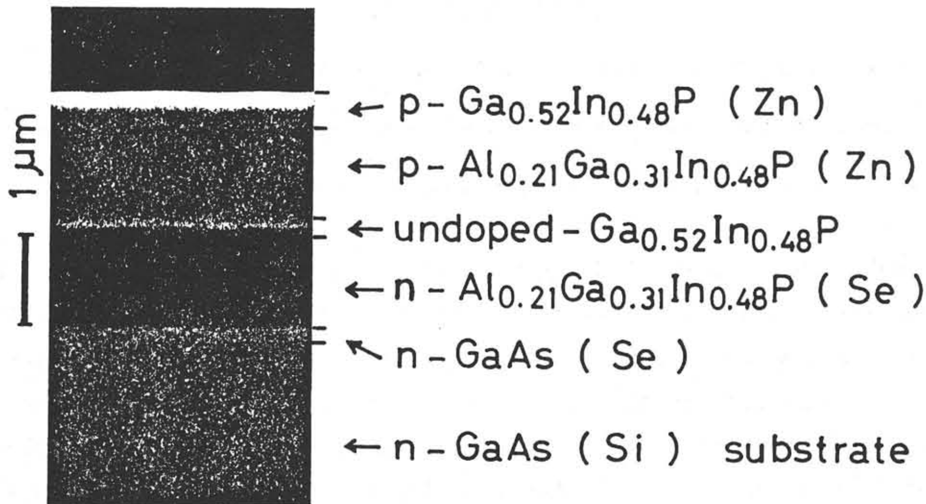

Fig.1 Scanning electron microscope image of a cleaved cross section of the DH wafer.

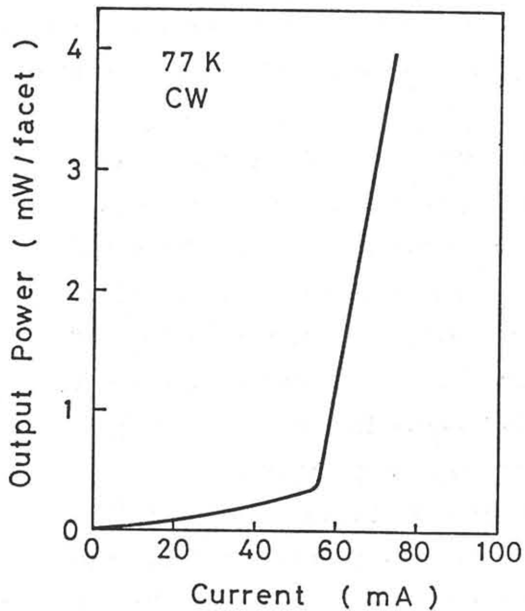

Fig.2 Light output power against dc current characteristics of the DH laser diode at 77 K.

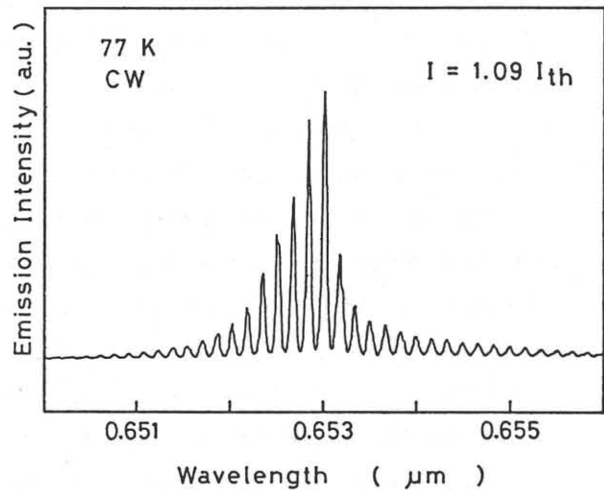

Fig.3 Emission spectrum of the DH laser diode under cw operation at 77 K.