Improving the Elextrical Characteristics of AlGaInP Laser Diode by Oxide Annealing

E-mail: 9314950@ mail.dyu.edu.tw

ABSTRACT

In this thesis the silicon dioxide is annealed by furnace so that the density of silicon dioxide is raised and improving the performance of the AlGaInP laser diode. In addition we also investigate the dependence of annealing temperature with devices .In this study the nitrogen gas is introduced to anneal silicon dioxide and the annealing temperature is changed from 300 to 450 to find the optimum annealing condition. From our study the threshold current Ith is reduced with increasing of the annealing temperature; Ith is 32.82mA and 24.83mA at non-annealed and 450 annealed sample respectively. The slope efficiency is also increased from non-annealed sample of 0.57 to 300 annealed sample of 0.8. So that the oxide annealing is effectively to reduce the threshold current and increase the slope efficiency. Furthermore we change the operation temperature to investigate the temperature stability of AlGaInP laser diode ; we obtain this device can normally operate at 90 and the characteristic temperature To is increased from 110.9K for non-annealed sample to 116.6k for 450 annealed sample. Thus the high temperature annealed sample exhibits high stability for temperature. For our knowledge this thesis is the first time to improve the performance of AlGaInP laser diode by oxide annealing.

Keywords : AlGaInP laser diode threshold current slope efficiency and characteristic temperature

Table of Contents

REFERENCES

[1] I. Youshia, T. Katsuyama, J. Hashimoto, and H. Hayashi, Jpn. J. Appl. Phys. 34. 803 (1995) [2] Pecaisnn and D. W. Treat, IEEE, 406(1998) [3] F. A. Kish, S. J. Caracci, N. Holonyak,Jr. and S. A. Maranowki, Appl. Phys. Lett. 59, 2883 (1991) [4] S. A. Maranowsk, F. A. Kish, S. J. Caracci, N. Holonyak, Jr., and J. H. Dallesasse, Appl. Phys. Lett. 61. 1688(1992) [5] S. C. Simth and R.D. Burnham Appl.Phys.Lett,Vol 61,P.321, 1992 [6] Masahiro Asada,Alfred R. Adams, IEEE Journal of Quantum Electronic,Vol.QE-17 ,P.611,1981 [6] David C. Brown,John H. Kelly,IEEE,J.Quantum Electron,QE-17,P.1754.1981 [7] F. A. Kish, Encycl. Chem. Technol.15, 217(1995) [8] H. Sugawara et al. Appl.Phys.Lett.74,3189(1993)