

3 - 22 Visible Light Emission from GaAs Surface Bombarded by Highly Charged Xe^{q+} Ion

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GaAs is a direct band gap semiconductor, which makes it a very useful material for the manufacture of light emitting diodes and semiconductor lasers. Impact of highly charged ions (HCI) on semiconductor solid surfaces gives rise to visible light emission from excited sputtered atoms. This work measured visible light emission from the monocrystal GaAs(100) surface bombarded by highly charged Xe^{q+} ($6 \leq q \leq 23$) as a function of charged state of the incident ion. The experiment was carried out at the 320 kV platform for multi-discipline research with HCIs in the Institute of Modern Physics, Chinese Academy of Sciences. This experimental result exists Ga I spectral lines, and does not emerge As. Fig. 1 shows the spectral lines Ga I 403.55 and 417.30 nm. They were the resonance transitions from the $5s2S_{1/2}$ state to the $4p2P_{1/2,3/2}$ states. For the different state of charge, Fig. 2 shows the intensities ratios of two Ga ($I_{417.30}/I_{403.55}$) spectral lines, and the ratio is independent of the charged state of incident ion. Our ratios are greater than 1.37 ± 0.05 and less than 2.6 in literatures^[1,2]. The change of fluctuation of curve in Fig. 2 is caused by instability of the ion current.

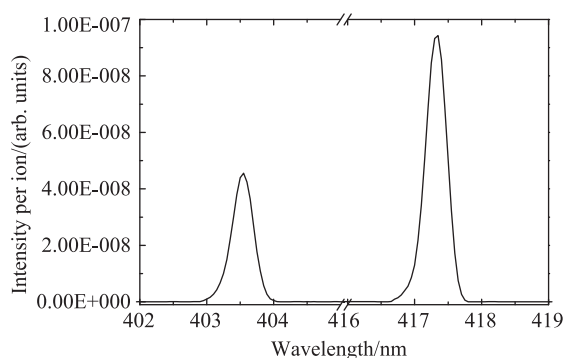


Fig. 1 Visible light emission spectrum of GaAs bombarded with 460 keV Xe^{6+} ion

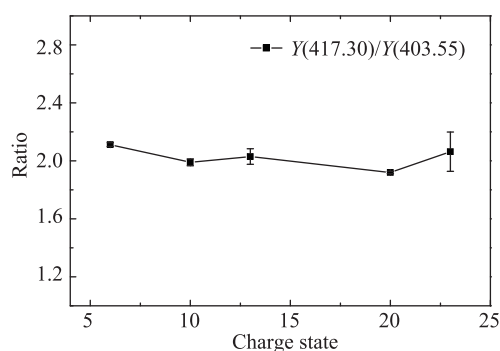


Fig. 2 Ratio of Ga I(417.30) to Ga I(403.55) for the different charge state at 460 keV.

References

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- [2] Debabrata Ghose, Vacuum, 46(1995)13.