Abstract Submitted
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Photoluminescence of GaAsBi alloys with emission wavelength up to 1.5 μm[1] XIANFENG LU, DANIEL BEATON, TOM TIEDJE, Department of Physics and Astronomy, University of British Columbia, Vancouver, Canada, YONG ZHANG, Electrical and Computer Engineering Department, University of North Carolina at Charlotte, Charlotte, North Carolina, USA — GaAsBi alloy has recently attracted much attention due to its wide range of bandgap accessible by incorporation of a small amount of bismuth. However Bi incorporation into GaAs requires anomalous growth conditions due to the strong tendency for Bi surface segregation under usual GaAs growth conditions. These anomalous growth conditions raise the question as to whether the electronic properties of the bismide alloys are adequate for device applications. To address this question we measured the room temperature photoluminescence (PL) of GaAsBi layers as a function of Bi concentration in the 0.4% - 10.6% range. At the maximum Bi concentration (10.6%) the PL emission peaks at 1500 nm. The PL intensity is found to increase with Bi concentration up to 4.5%, and then decrease at higher concentrations. The composition dependence of the PL emission wavelength is in good agreement with theoretical calculations of the bandgap from density functional theory. In addition, there is a logarithmic increase in the PL peak energy at high excitation intensity. These effects are attributed to the existence of localized states near the top of the valence band.

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