Turkish Journal of Physics

Turkish Journal

of

Physics

Keywords
Authors

phys@tubitak.gov.tr

Scientific Journals Home Page

Justification of Spherical Approximations using Degree of Linear Polarization of Hot Electron Luminescence from GaAs Crystal

M. N. KHALID
Optoelectronics Group, Cavendish Laboratory, Madingley Road,
Cambridge CB3 OHE, U. K.
e-mail: mnaeemk60@hotmail.com
Shazia YASIN
Microelectronics Research Centre, Cavendish Laboratory,
Madingley Road, Cambridge CB3 OHE, U.K.

Abstract: The anisotropic momentum distribution of photoexcited hot electrons on recombination with holes at the acceptor level produces linearly polarized luminescence. It is found that the degree of linear polarization (DoLP) of the luminescence over the whole width of the first heavy hole peak (0HH) is not constant. Calculations within the spherical approximation show that in bulk GaAs the DoLP over the 0HH peak should vary from zero, at the low energy side, to its maximum value (0.33), at the high energy side of the 0HH peak, for the electric vector of excitation \hat {\boldsymbol e}\vert \vert [110] excitation geometry and vice versa for the \hat {\boldsymbol e}\vert \vert [100] excitation geometry. This variation in the DoLP over the 0HH peak will be referred to as the anisotropy of the DoLP and arises as a direct result of the warping of the heavy hole sub-band. Experimental results were found in qualitative agreement with the calculations under spherical approximation. The calculations within the diagonal approximation could not account for the unexpectedly high value of the DoLP towards the low energy side of the 0HH peak.

Turk. J. Phys., **26**, (2002), 311-322.
Full text: pdf
Other articles published in the same issue: Turk. J. Phys.,vol.26,iss.4.