

POLARIZATION EFFECTS AT EMISSION
AND ABSORPTION OF LIGHT BY HOT
ELECTRONS IN MULTIVALLEY
SEMICONDUCTORS

P.M. Tomchuk, V.M. Bondar

Institute of Physics, Nat. Acad. of Sci. of Ukraine
(46, Nauky Ave., Kyiv 03680, Ukraine;
e-mail: ptomchuk@iop.kiev.ua)

S u m m a r y

The angular dependences of spontaneous light emission by hot electrons in multivalley semiconductors have been studied theoretically and experimentally, making use of n -Ge as an example. It has been demonstrated that the change of the scattering mechanism caused by the growth of electron temperature can bring about a modification of the behavior of the scattering angular dependence. The angular dependence of the emission in the case where the heating field is applied along the symmetry axis of the crystal – for n -Ge, it is the axis (1,0,0) – has been observed experimentally for the first time, and the corresponding theory has been developed. For the case where electrons have identical concentration and temperature in every valley, the angular dependence of emission was shown to be associated with the symmetry violation of the distribution function of electrons over the energy (in the theory, this means going beyond the scope of the traditional diffusion approximation).