

INFLUENCE OF ANISOTROPIC
SCATTERING MECHANISMS ON POLARIZATION
DEPENDENCES OF TERAHERTZ RADIATION
EMITTED BY HOT ELECTRONS

P.M. Tomchuk, V.M. Bondar, O.E. Levshin

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

S u m m a r y

The influence of anisotropic scattering mechanisms on the polarization dependences of terahertz (THz) radiation emitted by hot electrons in multivalley semiconductors of the n -Ge type has been studied both theoretically and experimentally. The main attention is focused on a situation where the electric field applied to a multivalley semiconductor is directed asymmetrically with respect to the valleys. Changing from the anisotropic mechanism of electron scattering by ionized impurities to that by acoustic phonons is demonstrated to result in the transformation of maxima into minima in the periodic polarization angular dependence of the radiation intensity emitted by hot electrons. The substitution of one dominating mechanism of scattering by another one can result from a number of reasons: the lattice temperature variation or the variation in the concentration of ionized impurities, the change in the magnitude or the orientation of the electron-heating field, the application of a unidirectional pressure or the specimen illumination. All those factors are shown to affect the polarization dependences of spontaneous radiation emitted by hot electrons in the case where the temperatures of electrons in different valleys are also different.