

Electron Mobility in Bulk n -Doped SiC-polytypes 3C-SiC, 4H-SiC and 6H-SiC: a comparison

© Clóves G. Rodrigues

School of Exact Sciences and Computing, Pontifical Catholic University of Goiás,
CP 86, 74605-010 Goiânia, Goiás, Brazil

E-mail: cloves@pucgoias.edu.br

Received July 1, 2020

Revised July 1, 2020

Accepted for publication July 8, 2020

This communication presents a comparative study on the charge transport (in transient and steady state) in bulk n -type doped SiC-polytypes: 3C-SiC, 4H-SiC and 6H-SiC. The time evolution of the basic macrovariables: the „electron drift velocity“ and the „non-equilibrium temperature“ are obtained theoretically by using a Non-Equilibrium Quantum Kinetic Theory, derived from the method of Nonequilibrium Statistical Operator (NSO). The dependence on the intensity and orientation of the applied electric field of this macrovariables and mobility are derived and analyzed. From the results obtained in this paper, the most attractive of these semiconductors for applications requiring greater electronic mobility is the polytype 4H-SiC with the electric field applied perpendicular to the c -axis.

Keywords: SiC, 4H-SiC, 6H-SiC, 3C-SiC, charge transport.

Full text of the paper will appear in journal SEMICONDUCTORS.