

Different shapes of impurity concentration profiles formed by long-range interstitial migration

O. I. Velichko¹

2016

¹Belarusian State University of Informatics and Radioelectronics, 6 P. Brovki Street, Minsk, 220013, Belarus.

Keywords: Silicon, boron, diffusion, implantation, impurity interstitials, modeling.

Abstract: A model of interstitial impurity migration is proposed which explains the redistribution of ion-implanted boron in low-temperature annealing of nonamorphized silicon layers. It is supposed that nonequilibrium boron interstitials are generated either in the course of ion implantation or at the initial stage of thermal treatment and that they migrate inward and to the surface of a semiconductor in the basic stage of annealing. It is shown that the form of the “tail” in the boron profile with the logarithmic concentration axis changes from a straight line if the average lifetime of impurity interstitials is substantially shorter than the annealing duration to that bending upwards for increasing lifetime.

The calculated impurity concentration profiles are in excellent agreement with the experimental data describing the redistribution of implanted boron for low-temperature annealing at 750°C for 1h and at 800°C for 35min. Simultaneously, the experimental phenomenon of incomplete electrical activation of boron atoms in the “tail” region is naturally explained.

Publication source:

Velichko, O. I. Different shapes of impurity concentration profiles formed by long-range interstitial migration / O. I. Velichko // International Journal of Computational Materials Science and Surface Engineering. – 2016. – Vol.05, No. 03. – P.1650014. – DOI : <https://doi.org/10.1142/S2047684116500147>.