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Research of the Activation Energy of Conductivity in P-I-N SiC Structures Fabricated by Doping with Aluminum Using the Low-Temperature Diffusion Method

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Abstract : The activation energy of conductivity in p-i-n SiC structures fabricated by doping with Aluminum using the new low-temperature diffusion method is investigated. In this method, diffusion is stimulated by the flux of carbon and silicon vacancies created by surface oxidation. The activation energy of conductivity in the p - layer is 0.25 eV and it is close to the ionization energy of Aluminum in 4H-SiC from 0.21 to 0.27 eV for the hexagonal and cubic positions of aluminum in the silicon sublattice for weakly doped crystals. The conductivity of the i-layer (measured in the reverse biased diode) shows 2 activation energies: 0.02 eV and 0.62 eV. Apparently, the 0.62 eV level is a deep trap level and it is a complex of Aluminum with a vacancy. According to the published data, an analogous level system (with activation energies of 0.05, 0.07, 0.09 and 0.67 eV) was observed in the ion Aluminum doped 4H-SiC samples.

Keywords : activation energy, aluminum, low temperature diffusion, SiC
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