

V. ION IMPLANTATION INTO 3C-SiC GROWN LAYERS AND APPLICATION TO MOSFET'S

1. Introduction

A selective doping technique is indispensable in fabrication of electronic devices especially for IC(integrated circuits). There are two major techniques for selective doping, namely, diffusion and ion implantation methods. Both methods are popular for a Si process. However, in the case of SiC the diffusion method is hard to apply, because the diffusion coefficients of impurities in SiC are very low. Campbell and Chang fabricated junction-gate FET's of α -SiC using a diffusion technique[1]. They reported that diffusion of Al into α -SiC required temperatures from 1800°C to 2100°C. Moreover, a special masking technique utilizing SiC was necessary. Thus, the diffusion method seems to be not practical for SiC. Ion implantation into α -SiC was attempted by many investigators[2-6]. Marsh investigated the activation of implanted impurities using various dopants[2]. Though the implantation of donor impurities such as N, P, Sb and Bi was successful, samples implanted with acceptors were high resistive even after annealing and the acceptors could not be activated. They explained that deep donor-type defects induced by the implantation prevented the activation of the implanted acceptors. Concerning 3C-SiC Kalinina et al.[7] reported a successful fabrication of p-n junction diodes by implantation of Al, however, they did not describe details of investigation. Though Kondo et al.[8] attempted hot implantation(specimens were intentionally heated during implantation) in addition to the standard implantation, the activation was unsuccessful. Edmond et al.[9] reported successful fabrication of p-n junction diodes by hot implantation of Al into undoped layers without annealing. The crystal growth methods of these two groups are similar to that of this investigation. The difference in their investigations is not clear.