

The Development of 4H-SiC Detector for Fast Minimum Ionization Particle Detection

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Inspired by the Low Gain Avalanche Diode (LGAD), we investigate the possibilities to produce similar device using 4H-SiC, benefiting from the intrinsic characteristics of the wide band gap properties of Silicon Carbide, such as higher saturated carrier velocity, higher atom displacement energy as well as the recent technological improvement of high-quality epitaxy with high resistance from industry. We introduce the possible applications of 4H-SiC detectors to fast MIPs detection and the present R&D status of 4H-SiC LGAD. We provide guidance to determine the thickness and doping level of the gain layer of 4H-SiC LGAD by TCAD simulation. Two prototypes of 4H-SiC LGAD devices with different designs by Nanjing University (NJU) are characterized which target achieving low gain multiplication in 4H-SiC material.

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