

Advancing Silicon Carbide Electronics Technology I

Metal Contacts to Silicon Carbide: Physics, Technology,
Applications

Eds. Konstantinos Zekentes and Konstantin Vasilevskiy

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The rapidly advancing Silicon Carbide technology has demonstrated a great potential in high-power low-loss semiconductor electronics. High thermal stability and outstanding chemical inertness make SiC an excellent material for development of high temperature electronics and semiconductor devices operating in harsh environment.

Keyword: Silicon Carbide Technology, Semiconductor Devices, SiC Device Fabrication, SiC Device Characterization, SiC Surface Cleaning, SiC Surface Etching, Electrical Characterization of SiC, Ohmic Contacts to SiC, Contact Resistivity Analysis, Ohmic Contact Fabrication, Metallization Schemes, Thermal Stability of Ohmic Contacts to SiC, Schottky Contacts to SiC, Schottky Barrier Formation, Schottky Diodes, Junction Barrier Schottky Diodes, Si/ SiC Heterojunction Diodes, Schottky Barrier Inhomogeneity in SiC, SiC Power Electronics, Temperature/Light Sensors, SiC Switching Devices, High Temperature Electronics, High Frequency Electronics, Thermal Stability of SiC

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Summary:

The rapidly advancing Silicon Carbide technology has a great potential in high temperature and high frequency electronics. High thermal stability and outstanding chemical inertness make SiC an excellent material for high-power, low-loss semiconductor devices. The present volume presents the state of the art of SiC device fabrication and characterization. Topics covered include: SiC surface cleaning and etching techniques; electrical characterization methods and processing of ohmic contacts to silicon carbide; analysis of contact resistivity dependence on material properties; limitations and accuracy of contact resistivity measurements; ohmic contact fabrication and test structure design; overview of different metallization schemes and processing technologies; thermal stability of ohmic contacts to SiC, their protection and compatibility with device processing; Schottky contacts to SiC; Schottky barrier formation; Schottky barrier inhomogeneity in SiC materials; technology and design of 4H-SiC Schottky and Junction Barrier Schottky diodes; Si/SiC heterojunction diodes; applications of SiC Schottky diodes in power electronics and temperature/light sensors; high power SiC unipolar and bipolar switching devices; different types of SiC devices including material and technology constraints on device performance; applications in the area of metal contacts to silicon carbide; status and prospects of SiC power devices.

