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Alok

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(54) **SUPERIOR SILICON CARBIDE INTEGRATED CIRCUITS AND METHOD OF FABRICATING**

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(58) **Field of Search** .... 438/275, DIG. 931; 257/139, 140, 141, 142, 143, 144, 214, 392, 717, 136, 264, 266; 326/80, 81, 83

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(57) **ABSTRACT**

The present invention provides semiconductor devices having at least one silicon region in a silicon carbide wafer in which is fabricated a low voltage semiconductor device such as for example, MOSFET devices, BiCMOS devices, Bipolar devices, etc., and on the same chip, at least one silicon carbide region in which is fabricated a high voltage (i.e., >1000V) semiconductor device using techniques well known in the art, such as for example, LDMOSFET, UMOSFET, DMOSFET, IGBT, MESFET, and JFET devices. Such devices are derived from a method for forming a silicon region on a silicon carbide substrate which comprises the steps of:

providing a monocrystalline silicon carbide substrate;

amorphizing at least one region of the substrate, preferably by subjecting at least a portion of a surface of the substrate to ion implantation to convert at least a portion of the substrate surface to amorphous silicon carbide producing a region of amorphous silicon carbide on a monocrystalline silicon carbide substrate;

removing at least an effective amount of carbon from said amorphized region, preferably by subjecting at least a portion of the amorphous silicon carbide region to an etchant material which selectively removes carbon to produce a region of amorphous silicon on a monocrystalline silicon carbide substrate; and

subjecting the monocrystalline substrate with at least a region of amorphous silicon to high temperature thermal anneal to produce a region of monocrystalline silicon on said monocrystalline silicon carbide substrate.

5 Claims, 2 Drawing Sheets