FP:("ASB Inc")

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1. 20020079510 METHOD OF MANUFACTURING A BIPOLAR DEVICE US - 27.06.2002

Int.Class H01L 21/331 **Appl.No** 09747761 **Applicant** ASB, Inc. **Inventor** Han, Tae-Hyeon

Disclosed are a method for manufacturing a homojunction or heterojunction bipolar device and a structure of the bipolar device manufactured by the method. The method comprises steps of forming a collector on a substrate including a buried collector to be contacted with the buried collector and protruded in the form of an island; depositing a collector dielectric film on the substrate on which the collector is formed; removing a protruded portion of the collector dielectric film covering the substrate; depositing a first semiconductor electrode layer on the substrate including the collector protruded over the collector dielectric film and flatting a surface of the first semiconductor electrode to expose only the collector formed of a semiconductor material and the first semiconductor electrode; and growing a base thin film including one of silicon and silicon-germanium on the substrate on which only the semiconductor material is exposed, thereby preventing the non-uniformity of a thickness of the base thin film, a contain rate of an impurity and a germanium distribution by the loading effect.

2. 2831329 BIPOLAR TRANSISTOR FR - 25.04.2003

Int.Class H01L 21/331 **Appl.No** 0213064 **Applicant** ASB INC **Inventor** RYUM BYUNG RYUL

A bipolar transistor is provided to increase an output power while minimizing a decrease of an operation frequency, and to reduce manufacturing cost by decreasing a device area in a condition of given operation frequency and output power. A main axis(2-3) is composed of a polygon having a bar type so that a circumference/area value of an emitter planar structure(2-1,2-2) is increased to improve a current driving capacitor of the emitter of the bipolar transistor. A plurality of branches(2-4) of a polygon are connected to the main axis. At least one side of the polygon of the branch is a roughness type.

3. 2385463 BIPOLAR TRANSISTOR GB - 20.11.2002

Int.Class H01L 21/331 **Appl.No** 0223732 **Applicant** ASB INC **Inventor** RYUM BYUNG RYUL

Disclosed is a bipolar transistor capable of reducing an emitter area at a given operating frequency and output power, as well as satisfying a demand for a device having a higher output power and operating frequency. The bipolar transistor includes a bar-type trunk having a polygonal cross-section, and a plurality of polygonal branches having a polygonal cross-section connected to the trunk, in which a current operating performance of the emitter is improved by increasing a value of a planar structure of the emitter.

4. 2001210655 BIPOLAR ELEMENT AND MANUFACTURING METHOD THEREFOR JP - 03.08.2001

Int.Class H01L 21/331 **Appl.No** 2000393228 **Applicant** ASB INC **Inventor** HAN TAE HYEON

PROBLEM TO BE SOLVED: To suppress the occurrence of leakage current to a collector region from a base and to uniform film thickness, distribution of germanium and impurity concentration in a base thin film.

SOLUTION: A substrate provided with an embedded collector 111, a collector 115, which is brought into contact with the buried collector and which protrudes in a land shape, a collector insulating film 117 extended to a collector side part, a first base semiconductor electrode 121a extended to the collector side part, so that a surface becomes the same plane as the collector surface, a base 125 which includes Si or Si-Ge formed on the collector, and a second base semiconductor electrode 123a which is extended to a base side part and includes Si or Si-Ge formed on the first base semiconductor electrode, are installed.

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5. 2003133327 BIPOLAR TRANSISTOR JP - 09.05.2003

Int.Class H01L 21/331 **Appl.No** 2002303745 **Applicant** ASB INC **Inventor** RYUM BYUNG RYUL

PROBLEM TO BE SOLVED: To reduce manufacturing cost by reducing element area in given operating frequency and output electric power, while satisfying the requirements for the element having high output and high operating frequency.

SOLUTION: To increase values (edge length/area) of the planar structure of an emitter and improve the current drive capacity of the emitter, an emitter planar structure 2-1 is formed of a bar-like polygonal main axis (trunk) 2-3 and a plurality of polygonal branches 2-4 connecting with the main axis 2-3. For example, when the planar structure is formed of a square main axis and a plurality of square branches, A, B and D all become 2 m respectively, and when C is 4 m, W is 10 m and L becomes 22 m.

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6. 000010249209 BIPOLARTRANSISTOR DE - 30.04.2003

Int.Class H01L 29/73 **Appl.No** 10249209 **Applicant** ASB INC **Inventor** RYUM BYUNG RYUL

Es wird ein Bipolartransistor beschrieben, der in der Lage ist, eine Emitterfläche bei einer gegebenen Betriebsfrequenz und Ausgangsleistung zu verringern, sowie die Nachfrage für eine Vorrichtung mit einer höheren Ausgangsleistung und Betriebsfrequenz zu befriedigen. Der Bipolartransistor umfaßt einen

stabartigen Stamm mit einem polygonalen Querschnitt und einer Mehrzahl von polygonalen Zweigen, die polygonale Querschnitte aufweisen und mit dem Stamm verbunden sind, wobei eine Strombetriebsleistung des Emitters durch Vergrößerung eines Werts einer Planarstruktur des Emitters verbessert ist.

7. 20020094654 METHOD OF MANUFACTURING BIPOLAR DEVICE AND STRUCTURE THEREOF US - 18.07.2002

Int.Class H01L 31/072 **Appl.No** 09765499 **Applicant** ASB, Inc. **Inventor** Han, Tae-Hyeon

Disclosed are a method for forming a base layer by epitaxial growth technology of a heterojunction bipolar device and a structure of the bipolar device manufactured by the method. The method comprises steps of depositing an insulation film containing silicon nitride on a substrate and removing a part of the insulation film to define a collector area; growing a first semiconductor in the collector area by selective epitaxial growth method to form the collector protruded over the insulation film in the form of a mushroom; forming an oxide film containing silicon dioxide on a surface of the collector protruded over the silicon nitride; selectively growing a second polycrystalline semiconductor material on only the nitride insulation film at the same height as the protruded portion of the collector to form a first base semiconductor electrode; removing an upper surface of the oxide film to expose the collector; and growing a second semiconductor containing silicon-germanium on the second polycrystalline semiconductor and the collector of the first semiconductor to form a second base semiconductor electrode on the first base semiconductor electrode and the base on the collector, thereby preventing a current leakage and a loading effect.

8. 6362066 METHOD FOR MANUFACTURING BIPOLAR DEVICES US - 26.03.2002

Int.Class H01L 21/331 **Appl.No** 09469395 **Applicant** ASB Inc. **Inventor** Ryum, Byung Ryul

The present invention is related to a bipolar transistor in which the in-situ doped epitaxial Si or SiGe base layer is used instead of using an ion-implanted Si base, in order to achieve higher cutoff frequency. The SiGe base having the narrower energy bandgap than the Si emitter allows to enhance the current gain, the cutoff frequency (f_T), and the maximum oscillation frequency (f_{max}). The narrow bandgap SiGe base also allows to have higher base doping concentration. As a result, the intrinsic base resistance is lowered and the noise figure is thus lowered. Parasitic base resistance is also minimized by using a metallic silicide base ohmic electrode. The present invention is focused on low cost, high repeatability and reliability by simplifying the manufacturing process step.

9. 2002217402 HETEROJUNCTION BIPOLAR ELEMENT AND ITS MANUFACTURING METHOD JP - 02.08.2002

Int.Class H01L 29/737 **Appl.No** 2000402564 **Applicant** ASB INC **Inventor** LEE SOO MIN

PROBLEM TO BE SOLVED: To suppress the generation of leakage current from a base to a collector region and to uniformized the thickness of a film in a base thin film, the distribution of germanium and the concentration of impurities.

SOLUTION: This element is provided with an insulation film 317 including a collector area provided with an almost perpendicular sidewall, a collector 115 with which the inside of the collector region is filled and which projects over the insulation film, an oxide film 199 covering the side surface of the projected part of the collector, a first base semiconductor electrode 122 which is formed on the insulation film in a manner to cover the outer side surface of the oxide film, a base 125 in contact with the collector, and second base semiconductor electrode 123a which is formed on the first base semiconductor electrode, in a manner of extending over the side of the base.

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10. 20020058388 BIPOLAR JUNCTION DEVICE US - 16.05.2002

Int.Class H01L 27/082 **Appl.No** 10027583 **Applicant** ASB, Inc. **Inventor** Ryum, Byung Ryul

The present invention is related to a bipolar transistor in which the in-situ doped epitaxial Si or SiGe base layer is used instead of using an ion-implanted Si base, in order to achieve higher cutoff frequency. The SiGe base having the narrower energy bandgap than the Si emitter allows to enhance the current gain, the cutoff frequency(f_T), and the maximum oscillation frequency (f_{max}). The narrow bandgap SiGe base also allows to have higher base doping concentration. As a result, the intrinsic base resistance is lowered and the noise figure is thus lowered. Parasitic base resistance is also minimized by using a metallic silicide base ohmic electrode. The present invention is focused on low cost, high repeatability and reliability by simplifying the manufacturing process step.

11. 2001085446 BIPOLAR DEVICE AND MANUFACTURING METHOD THEREFOR JP - 30.03.2001

Int.Class H01L 21/331 **Appl.No** 2000087444 **Applicant** ASB INC **Inventor** RYUM BYUNG RYUL

PROBLEM TO BE SOLVED: To provide a bipolar transistor having an improved operating speed by forming a silicon(Si) or silicon-germanium(SiGe) base thin film by crystal thin film growth method, and not by ion implantation method, in a transistor as one type of a semiconductor device.

SOLUTION: By using a silicon thin film 133 for the emitter and using silicon or silicon-germanium thin film 123b, having a smaller energy band gap than silicon for the base, a current gain and an operating speed of a transistor, that is, a cut-off frequency fT and a maximum oscillation frequency fmax can be increased. Or by increasing the doping concentration in the base of the transistor, intrinsic base resistance and parasitic base resistance can be reduced to further reduce a noise index. Using a self-alignment method, parasitic matching and a parasitic capacity are minimized, which is essential for increasing the operating speed of a device. At the same time, the process cost can be reduced by simplifying a manufacturing process and the suitability for mass-production is increased by improving reproducibility and reliability of the manufacturing process.

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12. 000010004067 MAKING BIPOLAR ELEMENT E.G. TRANSISTOR OPERATING IN HIGH GIGAHERTZ REGION, INVOLVES FORMING BASE LAYER, MASKING LAYER AND SECOND BASE SEMICONDUCTOR LAYER CARRYING OHMIC ELECTRODE IN METALLIC MATERIAL DE - 29.03.2001

Int.Class H01L 21/331 **Appl.No** 10004067 **Applicant** ASB INC **Inventor** RYUM BYUNG RYUL

Bipolar device is manufactured by forming base layer with an active base layer and a first base semiconductor electrode layer, from a semiconductor material of second type, on collector, forming a masking layer on active base layer, forming a second base semiconductor layer on first base semiconductor layer, and forming ohmic base electrode constructed in metallic material. A collector (111) is constructed in semiconductor material of a first type. A base layer is formed with an active base layer and a first base semiconductor electrode (123a) layer, from a semiconductor material of a second type, on the collector. A masking layer (191) is formed, covering the active base layer. A second base semiconductor layer is formed selectively on the first base semiconductor layer. An ohmic base electrode (129) is constructed in metallic material, selectively on the second base semiconductor electrode (123b). An Independent claim is included for the corresponding bipolar device.

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