CLAIMS

1. A boron-containing dopant composition for use in an ion implantation process, comprising:

diborane (B2H6) from 0.1%-10%;

hydrogen (H2) ranging from about 5%-15%; and

the balance being isotopically enriched boron trifluoride in boron mass isotope 11 ($11BF_3$);

wherein said composition is characterized by no greater than 10,000 ppm of higher order boranes.

2. The boron-containing dopant composition for use in an ion implantation process of claim 1, wherein the B2H6 and H2 are supplied as a mixture in a first supply source, and the 11BF3 is supplied in a second supply source.

3 The boron-containing dopant composition for use in an ion implantation process of claim 1, wherein the B2H6 and 11BF3 are supplied as a mixture in a first supply source, and the H2 is supplied in a second supply source.

4. The boron-containing dopant composition for use in an ion implantation process of claim 1, wherein the B2H6, H2 and 11BF3 is supplied as a mixture in a single supply source.

5. The boron-containing dopant composition for use in an ion implantation process of claim 1, wherein said B2H6 is isotopically enriched above natural abundance level.

6. The boron-containing dopant composition for use in an ion implantation process of claim 1, wherein said boron-containing dopant composition is produced at either an upstream location of the ion chamber and/or within the ion chamber.

7. A boron-containing dopant composition for use in an ion implantation process, comprising isotopically enriched boron trifluoride in boron mass isotope 11 (11BF3) configured to be supplied in a supply vessel wherein said 11BF3 is characterized by no greater than 10,000 ppm of higher order boranes and further wherein said supply vessel comprises hydrogen (H2).

8. The boron-containing dopant composition for use in an ion implantation process of claim 7, wherein said 11BF3 is supplied as part of a gas kit, said gas kit comprising a separate supply vessel comprising B2H6.

9. The boron containing dopant composition of claim 7, wherein said supply vessel is configured into a gas box.

10. The boron containing dopant composition of claim 7, wherein said supply vessel is a sub-atmospheric delivery package that is in fluid communication with an ion source apparatus configured to be operated to generate boron active ions, said ion source apparatus characterized by an average glitch rate of no greater than about 2 glitches per min during an ion source life.

11. The boron-containing dopant of claim 7, further characterized by the absence of a diluent gas.

12. The boron containing dopant composition of claim 10, wherein said supply vessel is a sub-atmospheric delivery package that is in fluid communication with an ion source apparatus configured to be operated to generate boron active ions, said ion source apparatus characterized by an average glitch rate of no greater than about 2 glitches per min during an ion source life of at least 100 hours.

13. A boron-containing dopant composition gas for use in an ion implantation process, comprising:

a gas storage and dispensing vessel comprising said boron-containing dopant composition gas mixture;

said boron-containing dopant composition gas mixture comprising:

isotopically enriched boron trifluoride in boron mass isotope 11 (11BF3); and

hydrogen, wherein said gas mixture is characterized by no greater than 10,000 ppm of higher order boranes;

further wherein said gas storage and dispensing vessel is configured into a gas box that is operably connected to an ion source apparatus to implant active boron ions.

14. The boron-containing dopant composition gas of claim 13, characterized by the substantial or entire absence of xenon or argon.