

**What is claimed is:**

1. A method of forming a silicon boron nitride layer, comprising:
  - positioning a substrate on a pedestal in a process region within a process chamber;
  - introducing a first flow of a first process gas and a second flow of a second process gas to the process region, wherein:
    - the first flow of the first process gas comprises a silicon-containing precursor, a nitrogen-containing precursor, hydrogen (H<sub>2</sub>), and at least two gases selected from the group consisting of argon, helium, nitrogen (N<sub>2</sub>), and any combination thereof, and
    - the second flow of the second process gas comprises:
      - about 2 molar percent (mol%) to about 15 mol% of diborane,
      - about 85 mol% to about 98 mol% of hydrogen (H<sub>2</sub>), and
      - a flow rate of about 1 sccm to about 5,000 sccm;
  - forming a plasma concurrently with the first flow of the first process gas and the second flow of the second process gas to the process region; and
  - exposing the substrate to the first process gas, the second process gas, and the plasma to deposit the silicon boron nitride layer on the substrate,
  - wherein the silicon boron nitride layer comprises about 10 atomic percent (at%) to about 50 at% of boron,
  - wherein the silicon boron nitride layer has a nitrogen to silicon atomic ratio of about 1.05 to about 1.5, and
  - wherein the silicon boron nitride layer has a leakage current of less than  $1 \times 10^{-9}$  A/cm<sup>2</sup> at 1.5 MV/cm, and wherein the silicon boron nitride layer comprises about 20 at% to about 35 at% of boron, wherein the silicon boron nitride layer has a nitrogen to silicon atomic ratio of about 1.1 to about 1.4, and wherein the silicon boron nitride layer has a leakage current of about  $5 \times 10^{-11}$  A/cm<sup>2</sup> to about  $9.9 \times 10^{-10}$  A/cm<sup>2</sup> at 1.5 MV/cm.