**What is claimed is:**

1. A method of depositing a material on a substrate in a processing chamber, comprising:

exposing a substrate to a deposition gas in the presence of RF power to deposit a phosphorus-doped, silicon nitride film on the substrate during a plasma-enhanced chemical vapor deposition process, wherein:

the deposition gas comprises a silicon precursor, a nitrogen precursor, a phosphorus precursor, and a carrier gas; and

the phosphorus-doped, silicon nitride film has a phosphorus concentration in a range from about 0.1 atomic percent (at%) to about 10 at%.

2. The method of claim 1, further comprising turning off the RF power while continuing to expose the substrate to the deposition gas, and wherein the phosphorus-doped, silicon nitride film is a hardmask layer or a stop etch layer.

3. The method of claim 1, wherein the plasma-enhanced chemical vapor deposition process is a pulsed plasma process which comprises pulsing the RF power on and off while continuing to expose the substrate to the deposition gas.

4. The method of claim 1, wherein the plasma-enhanced chemical vapor deposition process is a continuous plasma process which comprises maintaining the RF power on while continuing to expose the substrate to the deposition gas.

5. The method of claim 1, further comprising densifying the phosphorus-doped, silicon nitride film by exposing the substrate to hydrogen while continuing to expose the substrate to the deposition gas.

6. The method of claim 1, further comprising densifying the phosphorus-doped, silicon nitride film by sequentially alternating between cycles of the plasma-enhanced chemical vapor deposition process and a nitrogen-plasma process, wherein the

nitrogen-plasma process comprises exposing the substrate to a nitrogen plasma while ceasing to expose the substrate to the deposition gas.

7. The method of claim 1, wherein the phosphorus concentration is in a range from about 1 at% to about 6 at%.

8. The method of claim 1, wherein the phosphorus-doped, silicon nitride film has a nitrogen concentration in a range from about 40 at% to about 70 at% and a silicon concentration in a range from about 25 at% to about 55 at%.

9. The method of claim 1, wherein the phosphorus precursor comprises phosphine, methylphosphine, ethylphosphine, propylphosphine, butylphosphine, phosphorus oxychloride, trimethylphosphate, triethylphosphate, isomers thereof, or any combination thereof.

10. The method of claim 1, wherein the nitrogen precursor comprises ammonia, hydrazine, dimethyl hydrazine, tert-butylhydrazine, phenylhydrazine, 2,2'-azoisobutane, ethylazide, isomers thereof, or any combinations thereof, and wherein the silicon precursor comprises silane, disilane, trisilane, tetrasilane, pentasilane, methylsilane, chlorosilane, dichlorosilane, trichlorosilane, silicon tetrachloride, hexachlorodisilane, or any combinations thereof.

11. A method of depositing a material on a substrate in a processing chamber, comprising:

exposing a substrate to a deposition gas while depositing a phosphorus-doped, silicon nitride film on the substrate during a plasma-enhanced chemical vapor deposition process, wherein:

the deposition gas comprises a silicon precursor, a nitrogen precursor, a phosphorus precursor, and a carrier gas; and

the phosphorus-doped, silicon nitride film has a phosphorus concentration in a range from about 0.5 atomic percent (at%) to about 8 at%.

~~12. The method of claim 11, wherein the deposition gas comprises phosphine, silane, and ammonia, and wherein the phosphorus concentration is in a range from about 1 at% to about 6 at%.~~

~~13~~. A method of depositing a material on a substrate in a processing chamber, comprising:

exposing a substrate to a deposition gas to deposit a phosphorus-doped, silicon nitride film on the substrate during a plasma-enhanced chemical vapor deposition process, wherein:

the deposition gas comprises a silicon precursor, a nitrogen precursor, a phosphorus precursor, and a carrier gas; and

the phosphorus-doped, silicon nitride film has a phosphorus concentration in a range from about 0.1 atomic percent (at%) to about 10 at%;

ceasing the plasma-enhanced chemical vapor deposition process; then

exposing the substrate to a nitrogen plasma to densify the phosphorus-doped, silicon nitride film during a nitrogen-plasma process;

ceasing the nitrogen-plasma process; and

sequentially repeating cycles of the plasma-enhanced chemical vapor deposition process and the nitrogen-plasma process~~.~~

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~~14. The method of claim 13~~, wherein the plasma-enhanced chemical vapor deposition process is a pulsed plasma process which comprises pulsing an RF power on and off while continuing to expose the substrate to the deposition gas.

~~15. The method of claim 13, wherein the plasma-enhanced chemical vapor deposition process is a continuous plasma process which comprises maintaining an RF power on while continuing to expose the substrate to the deposition gas.~~