

What is claimed is:

1. A method, comprising:
 heating a substrate contained within a process chamber to a temperature in a range from about 100°C to about 700°C;
 producing a plasma with a power generator emitting an RF power of greater than 3 kW;
 flowing a hydrocarbon precursor into the plasma within the process chamber;
 and
 forming a carbon hard-mask layer on the substrate at a rate of greater than 5,000 Å/min; and

~~2. The method of claim 1, wherein the RF power is greater than 3 kW to about 7 kW.~~

~~3. The method of claim 1, wherein the carbon hard mask layer is formed on the substrate at a rate of greater than 5,000 Å/min to about 10,000 Å/min.~~

~~4. The method of claim 1, wherein the carbon hard mask layer is formed to a thickness of greater than 2.5 µm to about 10 µm.~~

~~5. The method of claim 1, further comprising flowing a carrier gas into the process chamber, wherein the carrier gas comprises argon, helium, nitrogen, hydrogen, oxygen, radicals thereof, or any combination thereof.~~

~~6. The method of claim 1, wherein the hydrocarbon precursor comprises a C₁-C₈ alkyl, a C₂-C₈ alkene, a C₂-C₈ alkyne, or any combination thereof.~~

~~7. The method of claim 1, wherein the hydrocarbon precursor comprises propylene, acetylene, ethylene, methane, propane, hexane, benzene, isoprene, butadiene, isomers thereof, or any combination thereof.~~

8. ~~The method of claim 1, further comprising flowing a dopant precursor into the plasma within the process chamber, wherein the dopant precursor comprises a nitrogen-containing precursor, a sulfur-containing precursor, a boron-containing precursor, or any combination thereof.~~

9. ~~The method of claim 8, wherein the dopant precursor comprises the nitrogen-containing precursor, and wherein the nitrogen-containing precursor comprises pyrrole, pyridine, an aliphatic amine, an aromatic amine, a nitrile, salts thereof, or any combination thereof.~~

10. ~~The method of claim 8, wherein the dopant precursor comprises the sulfur-containing precursor, and wherein the sulfur-containing precursor comprises thiophene, carbon disulfide, a thiol, salts thereof, or any combination thereof.~~

11. ~~The method of claim 8, wherein the dopant precursor comprises the boron-containing precursor, and wherein the boron-containing precursor comprises diborane, triborane, a trialkyl borane, a triallyl borane, or any combination thereof.~~

12. ~~The method of claim 1, wherein the process chamber is at a pressure in a range from about 3 Torr to about 20 Torr and the temperature is in a range from about 500°C to about 700°C.~~

13. ~~The method of claim 1, wherein the carbon hard-mask layer is formed on the device having a 96-bit architecture or a 128-bit architecture.~~

14. ~~A method, comprising:~~

~~heating a substrate contained within a process chamber to a temperature in a range from about 300°C to about 700°C;~~

~~producing a plasma with a power generator emitting an RF power of greater than 3 kW to about 7 kW;~~

~~flowing a hydrocarbon precursor into the plasma within the process chamber;~~
~~and~~

~~forming a carbon hard-mask layer on the substrate at a rate of greater than 5,000 Å/min to about 10,000 Å/min.~~

15. ~~A method, comprising:~~

~~heating a substrate contained within a process chamber to a temperature in a range from about 100°C to about 700°C;~~

~~producing a plasma with a power generator emitting an RF power of greater than 3 kW;~~

~~flowing a hydrocarbon precursor into the plasma within the process chamber;~~

~~flowing a dopant precursor into the plasma within the process chamber, wherein the dopant precursor comprises a nitrogen-containing precursor, a sulfur-containing precursor, a boron-containing precursor, or any combination thereof; and~~

~~forming a carbon hard mask layer on the substrate at a rate of greater than 5,000 Å/min to about 10,000 Å/min.~~