

CLAIMS

1. A process for removing at least a portion of a doped amorphous carbon film from a substrate having high aspect ratio structures, the process comprising:
depositing a polymer layer on at least a portion of a top end of a high aspect ratio structure on the substrate; and
removing at least a portion of the polymer layer and the doped amorphous carbon film from the substrate using a plasma strip process;
wherein depositing the polymer layer and removing at least a portion of the polymer layer and the doped amorphous carbon film are repeated until the doped amorphous carbon film is removed from the substrate.
2. The process of claim 1, wherein depositing the polymer layer comprises plugging one or more high aspect ratio structures with the polymer layer.
3. The process of claim 1, wherein depositing the polymer layer comprises forming the polymer layer on a sidewall of one or more high aspect ratio structures.
4. The process of claim 1, wherein the polymer layer is formed using polymer deposition with one or more of CHF_3 , H_2 , N_2 , Ar or their combination.
5. The process of claim 1, wherein the polymer layer is formed using a gas $\text{C}_x\text{H}_y\text{F}_z$ combined with any H_2 or any $\text{C}_{x1}\text{H}_{y1}$, where x, y, z, x1, and y1 are integers.
6. The process of claim 1, wherein the polymer layer is formed at a pressure in the range of about 10 mTorr to about 5 Torr.
7. The process of claim 1, wherein depositing the polymer layer is performed in an etch chamber and removing at least a portion of the polymer layer and the doped amorphous carbon film is performed in a strip chamber that is separate from the etch chamber.
8. The process of claim 1, wherein depositing the polymer layer and removing at least a portion of the polymer layer and the doped amorphous carbon film are performed in the same chamber.
9. The process of claim 1, wherein the plasma strip process uses a plasma formed using a mixture of an oxygen containing gas, a halogen containing gas, and a reducing gas that includes hydrogen.
10. The process of claim 9, wherein a ratio of the reducing gas to the halogen containing gas is in the range of about 0.001 to about 3.

11. The process of claim 1, wherein the doped amorphous carbon film is a boron doped amorphous carbon film.
12. A process for removing at least a portion of a mask layer from a substrate having a patterned area with one or more high aspect ratio structures, the process comprising:
placing the substrate in a plasma processing apparatus;
performing a polymer deposition process in the plasma processing apparatus to deposit a polymer layer on at least a portion of the patterned area of the substrate;
performing a plasma strip process in the plasma processing apparatus to remove at least a portion of the polymer layer and at least a portion of the mask layer from the substrate;
wherein the polymer deposition process clogs one or more high aspect ratio structures with the polymer layer.
13. The process of claim 12, wherein the polymer deposition process forms the polymer layer on a sidewall of one or more high aspect ratio structures.
14. The process of claim 12, wherein the polymer layer is formed using one or more of CHF_3 , H_2 , N_2 , Ar or their combination.
15. The process of claim 12, wherein the polymer layer is formed using a gas $\text{C}_x\text{H}_y\text{F}_z$ combined with any H_2 or any $\text{C}_{x1}\text{H}_{y1}$, where x, y, z, x1, and y1 are integers.
16. The process of claim 12, wherein the plasma processing apparatus comprises a strip chamber.
17. A process for removing at least a portion of a mask layer from a substrate having a patterned area with one or more high aspect ratio structures, the process comprising:
placing the substrate in a first plasma processing apparatus;
performing a polymer deposition process in the first plasma processing apparatus to deposit a polymer layer on at least a portion of the patterned area of the substrate;
transferring the substrate to a second plasma processing apparatus; and
performing a plasma strip process in the second plasma processing apparatus to remove at least a portion of the polymer layer and at least a portion of the mask layer from the substrate;
wherein the polymer deposition process clogs one or more high aspect ratio structures with the polymer layer.

18. The process of claim 17, wherein the first plasma processing apparatus comprises an etch chamber and the second plasma processing apparatus comprises a strip chamber.