What is claimed is:

1. A method of depositing an etch-resistant polymer layer on a substrate, the method comprising:

introducing a vapor of an organofluorine compound into a reaction chamber containing a substrate, the organofluorine compound containing a C≡N or C=N functional group; and

plasma activating an organofluorine compound to form the etch-resistant polymer layer on the substrate.

2. The method of claim 1, wherein the organofluorine compound has the formula: $N{\equiv}C{-}R^1$ or $(N{\equiv}C-)$-(R^2)-$(-C{\equiv}N)$, wherein R^1 is a functional group having the formula $H_aF_bC_c$ with a=1-11, b=1-11, and c=0-5 and R^2 is a functional group having the formula $H_aF_bC_c$ with a=0-11, b=1-11, and c=0-5.

3. The method of claim 1, wherein the organofluorine compound has the formula: $R^1_x[-C=N(R^2_z)]_y$, wherein x=1-2, y=1-2, z=0-1, x+z=1-3, and each R^1 and R^2 independently has the formula $H_aF_bC_c$ with a=0-11, b=0-11, and c=0-5.

4. The method of claim 1, wherein the organofluorine compound is selected from the group consisting of 2,2,3,3-tetrafluoropropionitrile, 2,3,3,3-tetrafluoropropionitrile (C_3HF_4N), difluoroacetonitrile (C_2HF_2N), trifluoroacetonitrile (C_2F_3N); Nonafluoropentanitrile (C_5F_9N); Pentafluoroallyl cyanide (C_4F_5N); Hexafluoroacetone imine (C_3HF_6N); 4,4,4-Trifluorocrotono-nitrile, 3,3,3-Trifluoropropionitrile, fluoroacetonitrile, octafluorohexane-1,6-dinitrile, 1,1-bis(trifluoromethyl)-2,2-dicyanoethylene, N,1,1,1,3,3,3-heptafluoro-propanamine, and 1,1,1,6,6,6-Hexafluoro-3-azahex-3-ene.

5. The method of claim 1, wherein the organofluorine compound is 2,3,3,3-tetrafluoropropionitrile (C_3HF_4N).

6. The method of claim 1, wherein the organofluorine compound is difluoroacetonitrile (C_2HF_2N).

7. The method of claim 1, wherein the organofluorine compound is trifluoroacetonitrile (C_2F_3N).

8. The method of claim 1, wherein the etch-resistant polymer layer forms a N-containing polymer passivation layer on sidewalls of a pattern etch structure.

9. The method of claim 8, wherein the pattern etch structure has an aspect ratio ranging from 1:1 to 50:1.

10. The method of claim 8, wherein the pattern etch structure has an aspect ratio ranging from 10:1 to 200:1.

11. The method of claim 8, wherein the protection layer prevents ions and radicals from etching the sidewalls.

12. The method of claim 8, wherein the etch-resistant polymer layer results in the pattern etch structure having a vertical profile that is straight with no bowing.

13. The method of any one of claims 1 to 12, further comprising removing the etch-resistant polymer layer using dry or wet etch chemistries.

14. The method of any one of claims 1 to 12, further comprising introducing an inert gas into the reaction chamber.

15. The method of claim 14, wherein the inert gas is selected from the group consisting of He, Ar, Xe, Kr, Ne, N_2, and combinations thereof.

16. A method of depositing an N-containing polymer passivation layer on a substrate, the method comprising:

introducing a vapor of an organofluorine compound into a reaction chamber containing a substrate, the organofluorine compound containing a C≡N or C=N functional group; and

producing fragments of the organofluorine compound by activating a plasma to form the N-containing polymer passivation layer on the substrate.

17. The method of claim 16, wherein the organofluorine compound is selected from the group consisting of 2,2,3,3-tetrafluoropropionitrile, 2,3,3,3-tetrafluoropropionitrile (C_3HF_4N), difluoroacetonitrile (C_2HF_2N), trifluoroacetonitrile (C_2F_3N); Nonafluoropentanitrile (C_5F_9N); Pentafluoroallyl cyanide (C_4F_5N); Hexafluoroacetone imine (C_3HF_6N); 4,4,4-Trifluorocrotono-nitrile, 3,3,3-Trifluoropropionitrile, fluoroacetonitrile, octafluorohexane-1,6-dinitrile, 1,1-bis(trifluoromethyl)-2,2-dicyanoethylene, N,1,1,1,3,3,3-heptafluoro-propanamine, and 1,1,1,6,6,6-Hexafluoro-3-azahex-3-ene.

18. The method of claim 16 or 17, further comprising removing the N-containing polymer passivation layer using dry or wet etch chemistries.

19. The method of claim 16 or 17, further comprising introducing an inert gas into the reaction chamber.

20. The method of claim 19, wherein the inert gas is selected from the group consisting of He, Ar, Xe, Kr, Ne, N_2, and combinations thereof.