## CLAIMS

What is claimed is:

1. A method, comprising:

applying a voltage and a tensile force to a filament taking the form of a wire made of a material, wherein:

the wire is positioned in a reaction volume comprising at most 10 mTorr of air and comprising hexafluoropropylene oxide vapor;

the reaction volume is positioned in a deposition chamber;

the voltage causes the wire to increase in temperature;

the wire heats the hexafluoropropylene oxide vapor, thereby causing it to decompose;

wherein the reaction volume has a total pressure of less than or equal to 100 Torr and greater than or equal to 1 mTorr;

wherein the temperature of the wire is greater than or equal to 150 °C and less than or equal to 1500 °C; and

wherein a ratio of the applied tensile force to a rated tensile strength of the material forming the wire is greater than or equal to 0.6 and less than or equal to 0.8 at the temperature of the wire.

2. The method of claim 1, further comprising:

sensing a resistance of the wire; and

if the sensed resistance of the wire is greater than or equal to 101% or less than or equal to 99% of a set point, and

if the sensed resistance of the wire differs by greater than or equal to 0.1% of the set point or less than or equal to 5% of the set point,

adjusting the voltage applied to the wire in order to maintain the temperature of the wire within the temperature range of greater than or equal to 150 °C and less than or equal to 1500 °C; and optionally providing a warning, if the sensed resistance of the wire is greater than or equal to 101% or less than or equal to 99% of the set point.

3. The method of claim 1, wherein an amount of hexafluoropropylene oxide vapor in the reaction volume is greater than or equal to 1 mol % and less than or equal to 100 mol % of the gases present in the reaction volume;

optionally wherein the reaction volume further comprises one or more carrier gasses, optionally wherein the one or more carrier gasses are an inert gas; and

optionally wherein the one or more carrier gasses have a one-dimensional flow which occurs across at least the top 25% and no more than the top 95% of the reaction volume.

4. The method of claim 1, wherein the total pressure is greater than or equal to 1 mTorr and less than or equal to 10 Torr.

5. The method of claim 1, wherein the reaction volume comprises a plurality of filaments taking the form of wires; optionally wherein an average distance between the wires is greater than or equal to 0.1 inch and less than or equal to 2.5 inches; or

wherein the average distance between the wires and the base of the reaction volume is greater than or equal to 0.1 inch and less than or equal to 24 inches; or

wherein the average distance between the wires and the base of the reaction volume is greater than or equal to 0.25 inches and less than or equal to 5 inches.

6. The method of claim 3, wherein the voltage adjustment applied is made by a proportional-integral-derivative controller.

7. The method of claim 1, wherein the ratio of the applied tensile force to the rated tensile strength of the material forming the wire is greater than or equal to 0.7 and less than or equal to 0.8 at a temperature of the filament.

8. A method for forming a coating on a substrate in a reaction volume, positioned in a deposition chamber; wherein:

the reaction volume is in fluidic communication with a source of a process gas comprising hexafluoropropylene oxide vapor and a source of vacuum;

the reaction volume is configured to allow one-dimensional flow of the process gas therethrough;

the reaction volume is capable of being evacuated of air by the source of vacuum;

the reaction volume comprises a filament taking the form of a wire configured to increase in temperature upon the application of a voltage thereto, wherein a temperature of the wire is selected to be greater than or equal to 150 °C and less than or equal to 1500 °C;

the wire is configured to heat the hexafluoropropylene oxide vapor, thereby causing it to decompose;

the reaction volume is enclosed by a plurality of walls and a base; wherein the method comprises:

placing the substrate within the reaction volume;

moving a portion and/or the entirety of the plurality of the walls and/or the base enclosing the reaction volume to minimize the reaction volume size around the substrate; and

depositing a fluorinated polymer onto at least a portion of the substrate;

optionally rotating at least a portion of the base;

optionally wherein the reaction volume comprises a plurality of filaments which are optionally positioned at least partially inside the reaction volume; and

optionally wherein the one-dimensional flow is present in at least the top 25% of the reaction volume and no more than the top 95% of the reaction volume.

9. The method of claim 8, wherein the portion of the base is rotated in one direction or the portion of the base is rotated continuously; and

optionally rotating the base at a rate of greater than or equal to 0.1 rpm and less than or equal to 10 rpm.

10. The method of claim 8, wherein a port is positioned between the source of the process gas and the reaction volume.

11. The method of claim 8, wherein the one-dimensional flow is parallel to the filament or is perpendicular to the filament.

12. The method of claim 8, further comprising rotating two or more portions of the base, when the at least portion of the base is rotated.

13. The method of claim 8, further comprising removing the base and/or one or more of the walls and/or further comprising cooling and/or heating the base and/or one or more of the walls.

14. The method of claim 8, wherein the base enclosing the reaction volume is a base of the deposition chamber.

15. A method, comprising:

depositing a coating comprising poly(tetrafluoroethylene) on a substrate, wherein:

the substrate is positioned in a reaction volume;

the reaction volume is positioned in a deposition chamber;

the reaction volume comprises at most 10 mTorr of air and comprises hexafluoropropylene oxide vapor;

the reaction volume comprises a filament taking the form of a resistively heated wire;

the wire heats the hexafluoropropylene oxide vapor, thereby causing it to decompose;

the substrate outgasses one or more gases during the deposition of the coating; and

the one or more gases make up greater than or equal to 0.1 mol% and less than or equal to 10 mol% of the gases present in the reaction volume during the deposition of the coating.

16. The method of claim 15, wherein a temperature of the wire is greater than or equal to 150° C and less than or equal to 1500° C.

17. The method of claim 15, wherein the reaction volume comprises a plurality of filaments taking the form of wires.

18. The method of claim 15, wherein the substrate comprises an elastomer.

19. The method of claim 15, wherein the poly(tetrafluoroethylene) is particulate, and wherein the particles have an average diameter of greater than or equal to 0.5 nm and less than or equal to 50 microns; or wherein the particles have an average diameter of greater than or equal to 1 nm and less than or equal to 1 micron.

20. The method of claim 8 or claim 15, wherein the hexafluoropropylene oxide vapor is present in the reaction volume in an amount that is greater than or equal to 1 mol % and less than or equal to 100 mol % of the gases present in the reaction volume.

21. The method of claim 8 or claim 15, wherein the reaction volume further comprises a carrier gas.

22. The method of claim 8 or claim 15, wherein a pressure of the reaction volume is greater than or equal to 1 mTorr and less than or equal to 100 Torr.