CLAIMS

What is claimed is:

1. A device for coating an interior surface of a housing defining a volume, the device comprising:

a plurality of reactant gas sources including reactant gases for one or more surface coating processes;

a fluid flow conduit fluidically coupled to the plurality of reactant gas sources and extending from the plurality of gas sources to the volume, wherein the fluid flow conduit is configured to deliver one or more of the reactant gases to the volume whereby the one or more surface coating processes produce one or more coating layers consisting of material deposited by chemical vapor deposition (CVD), atomic layer deposition (ALD), or both on all or a portion of an interior surface within the volume by reaction of the one or more reactant gases;

a first barrier disposed about the fluid flow conduit and dividing the fluid flow conduit into a first portion and a second portion within the volume;

first and second fluid flow ports disposed within the first and second portions, respectively, of the fluid flow conduit, wherein the reactant gases are flowable to the interior surface proximate the first and second fluid flow ports; and

a controller in electronic communication with the plurality of reactant gas sources and having a processor configured to control the plurality of reactant gas sources during the one or more surface coating processes such that one or more reactant gases, a plasma, or a combination thereof are introduced into the volume via the fluid flow conduit; and

the one or more coating layers are formed on all or a portion of the interior surface of the housing by reaction of the one or more reactant gases, the plasma, or the combination thereof.

2. The device of claim 1 further comprising:

a second barrier disposed about the fluid flow conduit and spaced a distance from the first barrier to form a first zone between the first and second barriers; and

a third barrier disposed about the fluid flow conduit and spaced a distance from the first barrier to form a second zone between the first and third barriers.

3. The device of claim 1 further comprising an actuator, wherein the actuator is coupled to the fluid conduit, the housing or both to translate and/or rotate the fluid conduit relative to the housing, the housing relative to the fluid conduit, or both.

4. The device of claim 1, wherein the volume has an aspect ratio that is less than or equal to about 0.5, the aspect ratio being an average width of the volume divided by an average length thereof.

5. The device of claim 2, wherein the first barrier is radially disposed about the fluid flow conduit such that the first zone and the second zone are axially spaced along fluid flow conduit, wherein the first barrier is axially disposed along a length of the fluid flow conduit such that the first zone and the second zone are radially spaced about the fluid flow conduit, or both.

6. The device of claim 2, wherein the first barrier, the second barrier, and/or the third barrier centralize the fluid flow conduit within the interior volume.

7. The device of claim 2 further comprising:

a plasma source fluidically coupled to the fluid flow conduit to provide plasma for the one or more surface coating processes;

an ion source fluidically coupled to the fluid flow conduit to provide ions for the one or more surface coating processes; and/or

a heating unit in thermal communication with the housing to heat the housing for the one or more surface coating processes.

8. The device of claim 1, wherein the device is coupled to an apparatus comprising the housing, and wherein the housing comprises production tubing, a pipeline, or a well tool.

9. The device of claim 8, wherein the apparatus comprises a focused sampling well tool.

10. The device of claim 9, wherein the focused sampling well tool comprises a single pump, whereby fluid is pulled into the focused sampling well tool via the single pump and a common suction line.

11. The device of claim 1 further comprising a cover positioned over a part of the interior surface, wherein the cover is configured to prevent the one or more surface coating processes from being applied to the part.