SUMMARY OF THE DISCLOSURE

[0007] This summary is provided to introduce a selection of concepts in a simplified form. These concepts are described in further detail in the detailed description of example embodiments of the disclosure below. This summary is not intended to necessarily identify key features or essential features of the claimed subject matter, nor is it intended to be used to limit the scope of the claimed subject matter.

[0008] The present disclosure is generally directed to a solid source precursor delivery system. More specifically, the present disclosure is directed to a solid source precursor vessel that is utilized to vaporize a supply of solid precursor stored within the vessel. The disclosed source vessel replaces a single serpentine channel used to store a supply of precursor and direct a carrier gas through the vessel with a plurality of individual cavities or pockets within the interior of the vessel. Each individual pocket may be loaded with precursor. In an arrangement, the pockets may be loaded with pre-formed blocks of compressed precursor that typically have a higher density than may be achieved when packing a powdered precursor in a serpentine channel. The increased density of the solid precursor material increases a capacity of the source vessel, resulting in longer intervals between replacement and/or refilling the source vessel.

[0008A] According to a first aspect of the present disclosure, there is provided a reactant source vessel comprising:

a container body having an outer sidewall and a bottom surface that define an internal area of the container body;

a plurality of pockets disposed within the internal area of the container body, each of the plurality of pockets configured to contain a volume of a solid source precursor, each of the plurality of pockets comprising at least one sidewall surface extending upward from the bottom surface of the

container body, wherein the at least one sidewall surface defines an interior perimeter of the pocket, and wherein the plurality of pockets comprises a first pocket disposed adjacent to a second pocket and a third pocket, the first pocket and the second pocket share a first sidewall, and the first pocket and the third pocket share a second sidewall;

a lid configured to engage the container body, the lid enclosing the internal area of the container body when connected to the container body;

a fluid flow path within the internal area of the container body, the fluid flow path being formed above the plurality of pockets and below a bottom surface of the lid, the fluid flow path extending between an inlet end and an outlet end along a path that passes over at least a portion of each of the plurality of pockets;

a first plurality of parallel dividing walls extending between a first set of opposing sidewalls of the container body; and

a second plurality of parallel dividing walls extending between a second set of opposing sidewalls of the container body,

wherein the first and second plurality of dividing walls intersect to define a matrix of the plurality of pockets, and

wherein the first and second plurality of dividing walls vary in height to define the fluid flow path between the inlet end and the outlet end.

[0008B] According to a second aspect of the present disclosure, there is provided a reactant source vessel comprising:

a container body having outer sidewalls and a bottom surface that define an internal area of the container body;

a first plurality of parallel dividing walls extending between a first set of opposing sidewalls of the container body;

a second plurality of parallel dividing walls extending between a second set of opposing sidewalls of the container body, wherein the first and second plurality of dividing walls intersect to define a matrix of pockets within the internal area of the container body, each of the matrix of pockets configured to contain a volume of a solid source precursor, each of the matrix of pockets comprising at least one sidewall surface extending upward from the bottom surface of the container body, wherein the at least one sidewall surface defines an interior perimeter of the pocket;

a lid having configured to engage the container body, the lid enclosing the internal area of the container body when connected to the container body; and

a fluid flow path defined by a bottom surface of the lid, the outer sidewall of the container and the first and second plurality of dividing walls, wherein the fluid flow path extends between an inlet end and an outlet end and passes over an upper surface of each of the matrix of pockets,

wherein the first and second plurality of parallel dividing walls vary in height to define the fluid flow path between the inlet end and the outlet end.

[0008C] According to an example of the present disclosure, there is provided a method for use with a reactant source vessel comprising:

accessing an interior area of a container body of the reactant source vessel, wherein the interior area includes a plurality of individual pockets;

inserting preformed blocks of compressed solid precursor into each of the plurality of individual pockets;

attaching a lid to the container body to enclose the interior area;

in conjunction with elevating a temperature of the reactant source vessel, directing a carrier gas through a flow path extending through the interior area of the reactant source vessel between a flow path inlet end and a flow path outlet end, wherein the carrier gas removes vaporized precursor from the vessel.

[0009] In an arrangement, a reactant source vessel is provided that includes a container body and a lid. The lid is configured to attach to the container body to enclose an internal area of the container body defined by one or more sidewalls and a bottom surface. Formed within the internal area of the container body are a plurality of individual pockets that are each configured to hold a volume of solid source precursor. In an arrangement, the pockets may be of a uniform size (e.g., have common dimensions). The individual pockets may have any configuration. For instance, the pockets may be cylindrical, rectangular prismatic, etc. Generally,

CLAIMS:

We claim:

1. A reactant source vessel comprising:

a container body having an outer sidewall and a bottom surface that define an internal area of the container body;

a plurality of pockets disposed within the internal area of the container body, each of the plurality of pockets configured to contain a volume of a solid source precursor, each of the plurality of pockets comprising at least one sidewall surface extending upward from the bottom surface of the container body, wherein the at least one sidewall surface defines an interior perimeter of the pocket, and wherein the plurality of pockets comprises a first pocket disposed adjacent to a second pocket and a third pocket, the first pocket and the second pocket share a first sidewall, and the first pocket and the third pocket share a second sidewall;

a lid configured to engage the container body, the lid enclosing the internal area of the container body when connected to the container body;

a fluid flow path within the internal area of the container body, the fluid flow path being formed above the plurality of pockets and below a bottom surface of the lid, the fluid flow path extending between an inlet end and an outlet end along a path that passes over at least a portion of each of the plurality of pockets;

a first plurality of parallel dividing walls extending between a first set of opposing sidewalls of the container body; and

a second plurality of parallel dividing walls extending between a second set of opposing sidewalls of the container body,

wherein the first and second plurality of dividing walls intersect to define a matrix of the plurality of pockets, and

wherein the first and second plurality of dividing walls vary in height to define the fluid flow path between the inlet end and the outlet end.

2. The vessel of claim 1, further comprising:

an inlet valve and an outlet valve attached to a top surface of the lid, wherein each valve connects to a fluid passage through the lid.

3. The vessel of claim 2, wherein the inlet valve is in fluid communication with the inlet end of the fluid flow path and the outlet valve is in fluid communication with the outlet end of the fluid flow path, when the lid is connected to the container body.

4. The vessel of claim 1, wherein each of the plurality of pockets comprises:

an open upper end; and

the at least one sidewall surface extending between the bottom surface of the container body and the open upper end.

5. The vessel of claim 4, wherein each pocket of the plurality of pockets have common dimensions.

6. The vessel of claim 4, wherein each pocket of the plurality of pockets comprises a rectangular prism.

7. The vessel of claim 1, further comprising:

an insert configured for disposition within the internal area of the container body, wherein the plurality of pockets are formed within the insert.

8. The vessel of claim 7, wherein the insert comprises at least a first layer and a second layer, wherein the first and second layers are stacked within the internal area of the container body to collectively define the plurality of pockets.

9. The vessel of claim 8, wherein the first and second layers of the insert are formed from a ceramic material.

10. The vessel of claim 1, wherein the flow path comprises a non-direct flow path between the inlet end and the outlet end.

11. The vessel of claim 1, wherein the first plurality of dividing walls and the second plurality of dividing walls are equally spaced between the first set of opposing sidewalls and the second set of opposing sidewalls, respectively.

12. A reactant source vessel comprising:

a container body having outer sidewalls and a bottom surface that define an internal area of the container body;

a first plurality of parallel dividing walls extending between a first set of opposing sidewalls of the container body;

a second plurality of parallel dividing walls extending between a second set of opposing sidewalls of the container body, wherein the first and second plurality of dividing walls intersect to define a matrix of pockets within the internal area of the container body, each of the matrix of pockets configured to contain a volume of a solid source precursor, each of the matrix of pockets comprising at least one sidewall surface extending upward from the bottom surface of the container body, wherein the at least one sidewall surface defines an interior perimeter of the pocket;

a lid having configured to engage the container body, the lid enclosing the internal area of the container body when connected to the container body; and

a fluid flow path defined by a bottom surface of the lid, the outer sidewall of the container and the first and second plurality of dividing walls, wherein the fluid flow path extends between an inlet end and an outlet end and passes over an upper surface of each of the matrix of pockets,

wherein the first and second plurality of parallel dividing walls vary in height to define the fluid flow path between the inlet end and the outlet end.

13. The vessel of claim 12, wherein the matrix of pockets each have common dimensions.

14. The vessel of claim 12, wherein the fluid flow path comprises a non-direct flow path between the inlet end and the outlet end.

15. The vessel of claim 12, further comprising:

an inlet valve and an outlet valve attached to a top surface of the lid, wherein each valve connects to a fluid passage through the lid and, when the lid is connected to the container body, the inlet valve is in fluid communication with the inlet end of the fluid flow path and the outlet valve is in fluid communication with the outlet end of the fluid flow path.

16. The vessel of claim 1, comprising a plurality of volumes of the solid source precursor, each of the volumes contained in a respective pocket in the plurality of pockets.

17. The vessel of claim 16, wherein a density of each of the plurality of the volume of the solid source precursor is greater than or equal to 3 g/cc.