THE CLAIMS

What is claimed is:

1. A fluid supply package comprising a pressure-regulated fluid storage and dispensing vessel, said dispensing vessel comprising two pressure regulators in series in an interior volume thereof, a first pressure regulator has a higher set point pressure and a second pressure regulator downstream of said first pressure regulator and upstream of a discharge port of a valve head has a lower set point pressure than the first pressure regulator, wherein the first pressure regulator set point pressure is at least twice the lower set point pressure and is between 100 psig to 1500 psig, the valve head adapted for dispensing of fluid from the dispensing vessel, said valve head comprising the discharge port, and a flow control valve that is operable to control fluid dispensing, and a fluid flow restrictor in a fluid discharge passage of the discharge port.

2. The fluid supply package of claim 1, wherein the pressure regulator upstream of the discharge port has a subatmospheric pressure set point.

3. The fluid supply package of claim 1, wherein the setpoint pressure of the second, downstream pressure regulator is between 100 torr and 100 psig.

4. The fluid supply package of claim 1, further comprising a flow path reducer connecting said first pressure regulator and said second pressure regulator downstream of said first pressure regulator and upstream of the discharge port of the valve head.

5. The fluid supply package of claim 1, wherein a gas discharge line is coupled to the discharge port of said valve head and a cycling valve is coupled to said gas discharge line that is selectively cycleable to establish fluid flow communication between the gas discharge line and one of a first branch line and a second branch line, said first branch line has a first flow isolation valve therein and is coupled with a pump arranged to exert suction on gas discharge line and to discharge gas in exhaust line; said second branch line contains pressurizing pump therein and is joined to pressurizing gas source, with second flow isolation valve in such line serving to control flow of pressurized gas to the pressurizing pump.

6. The fluid supply package of claim 1, wherein the pressure-regulated fluid storage and dispensing vessel contains a fluid.

7. The fluid supply package of claim 6, wherein said fluid comprises a fluid for semiconductor manufacturing, manufacturing of flat-panel displays, or manufacture of solar panels.

8. The fluid supply package of claim 6, wherein said fluid comprises a dopant source fluid.

9. A fluid supply package comprising a pressure-regulated vessel including a pressure regulator therein upstream of a discharge port of a valve head of the vessel, a pressurization/depressurization assembly comprising a gas discharge line that is coupled to the discharge port of a valve head, said valve head and a cycling valve coupled to said gas discharge line that is selectively cycleable to establish fluid flow communication between the gas discharge line and one of a first branch line and a second branch line, said first branch line has a first flow isolation valve therein and is coupled with a pump arranged to exert suction on gas discharge line and to discharge gas in exhaust line; said second branch line contains pressurizing pump therein and is joined to pressurizing gas source, with a second isolation valve in such line serving to control flow of pressurized gas to the pressurizing pump, said pressure regulator comprising a flow control element that is openable and closable in response to pressure at the discharge port, said pressurization/depressurization assembly arranged to repetitively and alternatingly apply pressure and reduce pressure at the discharge port so that the flow control element of the pressure regulator assembly is cyclically opened and closed for a predetermined time period to stabilize pressure and suppress pressure oscillations in subsequent dispensing operation of the fluid supply package.

10. The fluid supply package of claim 9, wherein the pressure-regulated vessel comprises a series arrangement of pressure regulators in the interior volume of the vessel.

11. The fluid supply package of claim 9, wherein the pressure regulator has a subatmospheric pressure set point.

12. A method of suppressing pressure oscillations in gas dispensed from a pressure-regulated vessel that comprises a first pressure regulator in the vessel, said method comprising repetitively and alternatingly applying pressure and reducing pressure at a discharge port of a valve head of the pressure-regulated

vessel, said discharge port connected to a gas discharge line, the pressure in the gas discharge line experienced by the discharge port cycles between pressure above a set point of the first pressure regulator and pressure condition below the set point of the first pressure regulator, so that a poppet of the first pressure regulator opens and closes; cycling the poppet opened and closed for a predetermined time period to stabilize pressure and suppress pressure oscillations in subsequent dispensing operation from the pressure-regulated vessel said stabilized pressure characterized by a graph of dispensed gas pressure from said pressure-regulated vessel as a function of time that is consistent and non-oscillatory in character.

13. The method of claim 12, wherein the pressure-regulated vessel comprises a series arrangement of pressure regulators in the interior volume of the vessel, said series arrangement comprises the first pressure regulator that has a higher set point pressure and a second pressure regulator downstream of said first pressure regulator and upstream of the discharge port of the valve head that has a lower set point pressure than the first pressure regulator and wherein the first pressure regulator set point pressure is at least twice the lower set point pressure and is between 100 psig to 1500 psig.

14. The method of claim 13, wherein the second pressure regulator has a subatmospheric pressure set point.

15. The method of claim 12, wherein the pressure-regulated vessel comprises two pressure regulators in series in an interior volume thereof, the first pressure regulator has a higher set point pressure and a second pressure regulator downstream of said first pressure regulator and upstream of the discharge port of the valve head has a lower set point pressure than the first pressure regulator, wherein the first pressure regulator set point pressure is at least twice the lower set point pressure and is between 100 psig to 1500 psig, the valve head adapted for dispensing of fluid from the vessel, said valve head comprising the discharge port and a flow control valve that is operable to control fluid dispensing and a fluid flow restrictor in a fluid discharge passage of the discharge port.

16. The method of claim 12, wherein the pressure-regulated vessel comprises a cycling valve coupled to said gas discharge line that is selectively cycleable to establish fluid flow communication between the gas discharge line and one of a first branch line and a second branch line, said first branch line has a first flow isolation valve therein and is coupled with a pump arranged to exert suction on gas discharge line and to discharge gas in exhaust line; said second branch line contains pressurizing pump therein and is joined to pressurizing gas source, with a second isolation valve in such line serving to control flow of pressurized

gas to the pressurizing pump, said first pressure regulator comprising a flow control element that is openable and closable in response to pressure at the discharge port, a pressurization/depressurization assembly arranged to repetitively and altematingly apply pressure and reduce pressure at the discharge port so that the flow control element of the first pressure regulator is cyclically opened and closed for a predetermined time period to stabilize pressure and suppress pressure oscillations in subsequent dispensing operation of the pressure-regulated vessel.