CLAIMS

What is claimed is:

1. A system for processing articles, the system comprising:
a fluid supply configured to supply a process fluid;
a process chamber configured to process articles;
a fluid delivery module, the fluid delivery module comprising:
an inlet fluidly coupled to the fluid supply;
an outlet fluidly coupled to the process chamber;
a flow passage extending from the inlet to the outlet;
a fluid flow component, the fluid flow component comprising:
a component base;
an inlet port formed in the component base;
an outlet port formed in the component base;
a flow path extending from the inlet port to the outlet port, the flow path forming a portion of the flow passage;
a sensing port in fluid communication with the flow path and located between the inlet port and the outlet port;
a sensing element sealing the sensing port; and
a sensor isolated from the process fluid by the sensing element, the sensor configured to detect a property of the process fluid within the flow path.

2. The system of claim 1 wherein the sensing element comprises sapphire.

3. The system of claim 1 wherein the sensor is a non-contact temperature sensor.

4. The system of any one of claims 1 to 3 wherein the sensor is in direct contact with a spacer, the spacer being in direct contact with the sensing element.

5. The system of claim 4 wherein the spacer has a plurality of notches in a bottom surface of the spacer, the bottom surface being in contact with the sensing element.

6. The system of any one of claims 1 to 5 wherein the sensing port comprises a groove configured to accept an O-ring.

7. The system of any one of claims 1 to 6 wherein the sensing port comprises a first sealing rib and wherein the sensing port comprises a second sealing rib concentric with the first sealing rib.

8. The system of claim 1 wherein the sensing element comprises a polymer.

9. The system of claim 1 or claim 8 wherein the sensor is a pressure sensor.

10. The system of claim 1 or any one of claims 8 or 9 wherein the sensor is in direct contact with the sensing element.

11. The system of any one of claims 1 to 10 wherein the fluid flow component comprises a sensor housing coupled to the component base, the sensor housing enclosing the sensor.

12. The system of claim 11 further comprising a second fluid flow component, the second fluid flow component comprising:

a component base;

an inlet port formed in the component base;

an outlet formed in the component base;

a flow path extending from the inlet port to the outlet port, the flow path forming a portion of the flow passage;

a sensing port in fluid communication with the flow path and located between the inlet port and the outlet port;

a sensing element sealing the sensing port;

a sensor isolated from the process fluid by the sensing element, the sensor configured to detect a second property of the process fluid within the flow path; and

a sensor housing coupled to the component base and enclosing the sensor;

wherein the property detected by the sensor of the fluid flow component is different from the second property detected by the sensor of the second fluid flow component; and

wherein the sensor housing of the fluid flow component is identical to the sensor housing of the second fluid flow component.

13. A system for processing articles, the system comprising:

a fluid supply configured to supply at least one process fluid;

a process chamber configured to process articles;

a fluid delivery module, the fluid delivery module comprising:

an inlet fluidly coupled to the fluid supply;

an outlet fluidly coupled to the process chamber;

a flow passage extending from the inlet to the outlet;

a first fluid flow component, the first fluid flow component comprising:

a first component base;

a first inlet port formed in the first component base;

a first outlet port formed in the first component base;

a first flow path extending from the first inlet port to the first outlet port, the first flow path forming a portion of the flow passage;

a first sensor configured to detect a first property of the at least one process fluid within the first flow path;

a first sensor housing coupled to the first component base and enclosing the first sensor;

a second fluid flow component, the second fluid flow component comprising:

a second component base;

a second inlet port formed in the second component base;

a second outlet port formed in the second component base;

a second flow path extending from the second inlet port to the second outlet port, the second flow path forming a portion of the flow passage;

a second sensor configured to detect a second property of the at least one process fluid within the second flow path;

a second sensor housing coupled to the second component base and enclosing the second sensor;

wherein the first and second sensors are different; and

wherein the first and second sensor housings are identical.

14. The system of claim 13 wherein the first and second properties are different.

15. The system of claim 13 or claim 14 wherein the first and second sensor housings each comprise a cavity, the first sensor enclosed by the first sensor housing and the second sensor housing enclosing the second sensor.

16. A fluid flow component, the fluid flow component comprising:

a component base;

an inlet port formed in the component base;

an outlet port formed in the component base;

a flow path extending from the inlet port to the outlet port;

a sensing port in fluid communication with the flow path and located between the inlet port and the outlet port;

a sensing element sealing the sensing port; and

a sensor isolated from the process fluid by the sensing element, the sensor configured to detect a property of the process fluid within the flow path.

17. The fluid flow component of claim 16 wherein the sensor is in direct contact with a spacer, the spacer being in direct contact with the sensing element.

18. The fluid flow component of claim 17 wherein the spacer is compressed between the sensing element and a sensor housing, the sensor and the spacer located within a cavity in the sensor housing.

19. The fluid flow component of claim 16 wherein the sensing port comprises a groove configured to accept an annular ring of the sensing element.

20. The fluid flow component of any one of claims 16 to 19 wherein the fluid flow component comprises a sensor housing coupled to the component base, the sensor housing enclosing the sensor.

21. A fluid flow component, the fluid flow component comprising:

a component base;

an inlet port formed in the component base;

an outlet port formed in the component base;

a flow path extending from the inlet port to the outlet port; and

a sensing element having a bottom side and a top side, the bottom side in contact with a process fluid flowing through the flow path, the flow path having a restriction height and a restriction width at a restriction plane intersecting the sensing element;

wherein a restriction ratio between the restriction height and the restriction width is 0.25 or less.

22. The fluid flow component of claim 21 further comprising a restriction element, the restriction plane intersecting the restriction element.

23. The fluid flow component of claim 21 or claim 22 further comprising a restriction element, the restriction height measured between the bottom side of the sensing element and the restriction element.