WHAT IS CLAIMED IS:

1. An inline particle sensor comprising:

a cylindrically-shaped sensor head configured to mount within a bore of a fitting, the sensor head including a laser source configured to emit laser light into a vacuum line, the sensor head including detection circuitry configured to provide a signal indicative of particle scattered laser light, the laser source and the detection circuitry being configured to provide a thin sensing volume with large cross sectional area; and

electronics coupled to the sensor head and configured to receive the signal from the detection circuitry and provide a particle output based on the signal from the detection circuitry.

2. The inline particle sensor of claim 1, wherein a predominant axis of scattered light detection is approximately orthogonal to a predominant direction of particle flow and simultaneously approximately orthogonal to a predominant laser beam direction.

3. The inline particle sensor of either claim 1 or 2, wherein the laser source emits a wavelength or wavelengths within the band from vacuum UV to about 480 nm.

4. The inline particle sensor of any of claims 1-3, and further comprising a laser interlock.

5. The inline particle sensor of claim 4, wherein the laser interlock is a vacuum switch configured to close below a selected vacuum threshold.

6. The inline particle sensor of claim 4, wherein the laser interlock includes a pressure sensor.

7. The inline particle sensor of any of claims 1-6, and further comprising a flow restrictor configured to be positioned in one of the ports of the fitting.

8. The inline particle sensor of any of claims 1-7, wherein the fitting is coupled to a vacuum pump line between a vacuum pump and a process chamber.

9. The inline particle sensor of any of claims 1-7, wherein the fitting is coupled to a vacuum pump line between a low-pressure vacuum pump and a high-pressure vacuum pump.

10. The inline particle sensor of any of claims 1-9, wherein the electronics are externally coupled to the sensor head.

11. The inline particle sensor of any of claims 1-9, wherein the electronics are contained within the sensor head.

12. An inline particle sensor system comprising:

a vacuum pump;

a vacuum pump line;

a process chamber;

a fitting fluidically coupled to the vacuum pump line between the vacuum pump and the process chamber;

an inline particle sensor comprising a laser source inserted into a bore of the fitting and configured to sense scattered light of particles within the sensor system and generate a sensor signal indicative of the presence of the particles; and

electronics coupled to the vacuum particle sensor configured to receive the sensor signal and generate a particle output based on the sensor signal,

wherein the laser source and the electronics being configured to provide a thin sensing volume with large cross sectional area.

13. The inline particle sensor system of claim 12, wherein the vacuum pump is a low-pressure vacuum pump or a high-pressure vacuum pump.

14. The inline particle sensor system of either claim 12 or 13, wherein the inline particle sensor comprises a laser source configured to emit a laser at a wavelength from UV to 480 nm.

15. The inline particle sensor system of claim 14, wherein the laser source has an output power of about 3.5 watts.

16. The inline particle sensor system of any of claims 12-15, and further comprising a second inline particle sensor coupled to a second fitting, wherein the second fitting is fluidically coupled to the vacuum pump line between the vacuum pump and the process chamber.