CLAIMS

1. An apparatus comprising:

a wafer, wherein the wafer is compatible with a semiconductor processing chamber;

an electronic assembly;

a nested enclosure assembly including an outer enclosure formed from fused silica and an inner enclosure, wherein the outer enclosure encloses the inner enclosure, wherein the inner enclosure encloses at least the electronic assembly, wherein the nested enclosure and the electronic assembly are disposed on the wafer;

an insulating medium disposed within a cavity between the outer surface of the inner enclosure and the inner surface of the outer enclosure, wherein the inner enclosure, the outer enclosure, and the insulating medium are configured to maintain the electronic assembly at or below a temperature of 150 °C when the nested enclosure is exposed to a processing environment having a temperature up to 800 °C; and

a sensor assembly communicatively coupled to the electronic assembly, wherein the sensor assembly includes two or more sensors, wherein the two or more sensors include a first sensor disposed at a first location of the wafer and a second sensor disposed at a second location of the wafer different from the first location, wherein the two or more sensors are configured to acquire one or more measurement parameters at the two or more locations of the wafer, wherein the electronic assembly is configured to receive the one or more measurement parameters from the two or more sensors.

2. The apparatus of claim 1, wherein at least one of the two or more sensors comprises:

one or more temperature sensors configured to acquire one or more parameters indicative of temperature.

3. The apparatus of claim 2, wherein at least one of the two or more temperature sensors comprises:

one or more thermocouple devices.

4. The apparatus of claim 2, wherein at least one of the two or more temperature sensors comprises:

one or more resistance temperature devices.

5. The apparatus of claim 1, wherein at least one of the two or more sensors comprises:

one or more pressure sensors configured to acquire one or more parameters indicative of pressure.

6. The apparatus of claim 1, wherein at least one of the two or more sensors comprises:

one or more chemical sensors configured to acquire one or more parameters indicative of a presence of a targeted chemical.

7. The apparatus of claim 1, wherein at least one of the two or more sensors comprises:

one or more radiation sensors configured to acquire one or more parameters indicative of a presence of radiation.

8. The apparatus of claim 1, wherein the electronic assembly comprises:

one or more processors;

communication circuitry;

memory; and

a power source.

9. The apparatus of claim 1, further comprising:

a dummy enclosure assembly, wherein the dummy enclosure assembly is disposed at a position on the wafer to maintain a center of mass of the apparatus at a center of the wafer.

10. The apparatus of claim 1, wherein the insulating medium comprises:

a porous solid material.

11. The apparatus of claim 10, wherein the insulating medium is opaque.

12. The apparatus of claim 11, wherein the insulating medium is absorptive.

13. The apparatus of claim 10, wherein the insulating medium

comprises:

an aerogel.

14. The apparatus of claim 10, wherein the insulating medium comprises:

a ceramic material.

15. The apparatus of claim 1, wherein the insulating medium comprises:

one or more gases.

16. The apparatus of claim 15, wherein the one or more gases is maintained at a pressure less than atmospheric pressure.

17. The apparatus of claim 16, wherein the one or more gases is maintained at a pressure less than ambient pressure.

18. The apparatus of claim 1, further comprising:

one or more support structures supporting the inner enclosure on the internal surface of the outer enclosure.

19. The apparatus of claim 18, wherein the one or more support structures are formed from a thermal insulating material.

20. The apparatus of claim 1, further comprising: a layer of thermal insulating material disposed between an outer surface of a bottom portion of the inner enclosure and an inner surface of a bottom portion of the outer enclosure.

21. The apparatus of claim 1, further comprising:

one or more support structures for supporting the outer enclosure on the substrate.

22. The apparatus of claim 21, wherein the one or more support structures are formed from a thermal insulating material.

23. The apparatus of claim 1, wherein the inner enclosure is formed from a material having a heat capacity above a selected value.

24. The apparatus of claim 1, wherein the inner enclosure is formed from at least one of a metal, an alloy or a composite.

25. The apparatus of claim 24, wherein the inner enclosure is formed from at least one of an iron-nickel-cobalt alloy, an iron-nickel alloy, or an iron-carbon alloy.

26. The apparatus of claim 1, wherein the inner enclosure is formed from one or more crystalline materials.

27. The apparatus of claim 26, wherein the inner enclosure is formed from at least one of sapphire or crystalline quartz.

28. The apparatus of claim 1, wherein the outer enclosure is formed from a material having a contamination rate below a selected level.

29. The apparatus of claim 1, wherein the outer enclosure is formed from at least one of silicon, silicon carbide, silicon nitride or silicon dioxide.

30. The apparatus of claim 1, further comprising: at least one of a high reflectivity layer disposed on the outer surface of the inner enclosure or a high reflectivity layer disposed on the inner surface of the outer enclosure.

31. The apparatus of claim 30, wherein the high reflectivity layer includes at least one of gold, silver or aluminum.

32. The apparatus of claim 30, wherein the high reflectivity layer is a stacked dielectric film comprising at least one of an oxide, a nitride or a carbide.

33. The apparatus of claim 1, wherein the electronic assembly is configured to calculate one or more values from the one or more acquired measurement parameters.

34. The apparatus of claim 1, further comprising: a remote data system communicatively coupled to the electronic assembly, wherein the electronic assembly is configured to transmit the one or more measurement parameters to the remote data system.