Claims

1. An apparatus comprising: a substrate assembly including a bottom substrate and a top substrate, wherein the top substrate is mechanically coupled to the bottom substrate; an electronic assembly; a nested enclosure assembly including an outer enclosure and an inner enclosure, wherein the outer enclosure encloses the inner enclosure, wherein the inner enclosure encloses at least the electronic assembly; an insulating medium disposed within a cavity between an outer surface of the inner enclosure and an inner surface of the outer enclosure; and a sensor assembly communicatively coupled to the electronic assembly, wherein the sensor assembly includes one or more sensors, the one or more sensors disposed within the substrate assembly at one or more locations across the substrate assembly, wherein the one or more sensors are configured to acquire one or more measurement parameters at the one or more locations across the substrate assembly, wherein the electronic assembly is configured to receive the one or more measurement parameters from the one or more sensors, wherein the apparatus is disposed on a rotatable platform.

2. The apparatus of claim 1, wherein the one or more sensors comprise: one or more temperature sensors configured to acquire one or more parameters indicative of temperature.

3. The apparatus of claim 2, wherein the one or more temperature sensors comprise: one or more thermocouple devices.

4. The apparatus of claim 2, wherein the one or more temperature sensors comprise: one or more resistance temperature devices.

5. The apparatus of claim 1, wherein the one or more sensors comprise: one or more pressure sensors configured to acquire one or more parameters indicative of pressure.

6. The apparatus of claim 1, wherein the one or more sensors comprise: 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 the one or more sensors comprise: 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 one or more sensors are coated with a high reflectivity material.

9. The apparatus of claim 1, wherein at least one of the bottom substrate or the top substrate are formed from at least one of a ceramic, a cermet, a crystalline material or a glass.

10. The apparatus of claim 9, wherein at least one of the bottom substrate or the top substrate are formed from at least one of silicon, silicon carbide, silicon nitride or silicon dioxide.

11. The apparatus of claim 1, wherein the bottom substrate and the top substrate are sealed by at least one of welding or bonding.

12. The apparatus of claim 1, wherein the enclosure assembly is mechanically coupled to the substrate assembly.

13. The apparatus of claim 12, wherein the enclosure assembly is sealed to the substrate assembly by at least one of welding or bonding.

14. The apparatus of claim 1, wherein the electronic assembly comprises: one or more processors; communication circuitry; memory; and a power source.

15. The apparatus of claim 1, further comprising: a dummy enclosure assembly, wherein the dummy enclosure assembly is disposed at a position on the substrate assembly to maintain a center of mass of the apparatus at a center of the substrate assembly.

16. The apparatus of claim 1, wherein each of the one or more sensors are disposed on or within a sensor substrate, wherein the sensor substrate is disposed between the bottom substrate and the top substrate of the substrate assembly.

17. The apparatus of claim 16, wherein the sensor substrate comprises: at least one of a silicon substrate, a silicon carbide substrate, a silicon nitride substrate, a gallium nitride substrate, a gallium arsenide substrate, a germanium substrate, or a substrate of gallium and indium.

18. The apparatus of claim 1, wherein the insulating medium comprises: a porous solid material.

19. The apparatus of claim 18, wherein the insulating medium is opaque.

20. The apparatus of claim 19, wherein the insulating medium is absorptive.

21. The apparatus of claim 18, wherein the insulating medium comprises: an aerogel.

22. The apparatus of claim 18, wherein the insulating medium comprises: a ceramic material.

23. The apparatus of claim 1, wherein the insulating medium comprises: one or more gases.

24. The apparatus of claim 23, wherein the one or more gases is maintained at a pressure less than atmospheric pressure.

25. The apparatus of claim 24, wherein the one or more gases is maintained at a pressure less than ambient pressure.

26. The apparatus of claim 1, further comprising: one or more support structures supporting the inner enclosure on the inner surface of the outer enclosure.

27. The apparatus of claim 26, wherein the one or more support structures are formed from a thermal insulating material.

28. 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.

29. The apparatus of claim 1, further comprising: one or more support structures for supporting the outer enclosure on the substrate.

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

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

32. The apparatus of claim 31, 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.

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

34. The apparatus of claim 33, wherein the inner enclosure is formed from at least one of sapphire or crystalline quartz.

35. The apparatus of claim 1, wherein the outer enclosure is formed from at least one of a ceramic, a cermet, a crystalline material or a glass.

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

37. The apparatus of claim 36, wherein the outer enclosure is formed from at least one of silicon, silicon carbide, silicon nitride or silicon dioxide.

38. 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, or between the inner surface of the outer enclosure and the outer surface of the inner enclosure.

39. The apparatus of claim 38, wherein the high reflectivity layer includes at least one of gold, silver or aluminum.

40. The apparatus of claim 38, wherein the high reflectivity layer is a stacked dielectric film comprising at least one of an oxide, a nitride or a carbide.

41. 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.

42. 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, wherein the remote data system is configured to calculate a value from the one or more acquired measurement parameters acquired by the one or more sensors.

43. The apparatus of claim 42, wherein the remote data system is configured to map the one or more values to the one or more locations of the substrate.

44. The apparatus of claim 43, wherein the remote data system is configured to report the mapped one or more values to a user interface.

45. An apparatus comprising: a substrate assembly including a bottom substrate and a top coating layer; an electronic assembly; a nested enclosure assembly including an outer enclosure and an inner enclosure, wherein the outer enclosure encloses the inner enclosure, wherein the inner enclosure encloses at least the electronic assembly; an insulating medium disposed within a cavity between an outer surface of the inner enclosure and an inner surface of the outer enclosure; and a sensor assembly communicatively coupled to the electronic assembly, wherein the sensor assembly includes one or more sensors, the one or more sensors disposed on the bottom substrate of the substrate assembly at one or more locations across the bottom substrate, wherein the top coating layer at least coats the one or more sensors disposed on the bottom substrate, wherein the one or more sensors are configured to acquire one or more measurement parameters at the one or more locations across the substrate assembly, wherein the electronic assembly is configured to receive the one or more measurement parameters from the one or more sensors, wherein the apparatus is disposed on a rotatable platform.

46. A method comprising: acquiring a set of measurement parameters with one or more sensors of a sensor assembly, wherein the one or more sensors are distributed at one or more locations of a substrate assembly; storing the set of measurement parameters in an electronic assembly communicatively coupled to the sensor assembly and disposed within a nested enclosure assembly including an outer enclosure and an inner enclosure, wherein the outer enclosure encloses the inner enclosure, wherein the inner enclosure encloses the electronic assembly, wherein an insulating medium disposed within a cavity between an outer surface of the inner enclosure and an inner surface of the outer enclosure, wherein the sensor assembly, electronic assembly, and the nested enclosure assembly are disposed on a rotatable platform; and calculating a value for each of the measurement parameters.