

What is claimed is:

1. A probe assembly, comprising:
 - an enclosure having a first end and a second end opposite the first end;
 - a first window adjacent to the first end of the enclosure;
 - a second window opposite the first window, the second window adjacent to the first end of the enclosure;
 - a first laser source aligned with the first window;
 - a second laser source opposite the first laser source and aligned with the second window;
 - a shaft disposed in the enclosure; and
 - a test structure disposed on the first end of the shaft, the test structure adjacent to the first end of the enclosure.
2. The probe assembly of claim 1, further comprising:
 - an actuator coupled to the shaft.
3. The probe assembly of claim 2, further comprising:
 - a controller coupled to the first laser source, the second laser source, and the actuator.
4. The probe assembly of claim 2, wherein the actuator translates the shaft along the enclosure and through the first end of the enclosure.
5. The probe assembly of claim 1, further comprising:
 - a cooling jacket surrounding the enclosure.
6. The probe assembly of claim 1, wherein the first laser source and the second laser source are configured to measure a thickness of a coating deposited on the test structure.

7. The probe assembly of claim 1, further comprising:
 - a microscope objective positioned between the first laser source and the first window;
 - a dichroic mirror disposed between the microscope objective and the first laser source;
 - a Raman spectrometer aligned with the dichroic mirror; and
 - a controller connected to the Raman spectrometer, the first laser source and the second laser source.
8. A process chamber, comprising:
 - a body defining a process volume therein;
 - a melt pool disposed in the process volume;
 - one or more ingots disposed in the melt pool;
 - one or more electron beam generators disposed on the body opposite the melt pool, each of the one or more electron beam generators aligned with one of the one or more ingots;
 - a holder disposed in the process volume between the one or more electron beam generators and the melt pool;
 - a plurality of substrates disposed on the holder;
 - a plume generated by the one or more electron beam generators melting the one or more ingots in the melt pool, the plume surrounding the plurality of substrates;
 - a first laser source disposed adjacent to a first side of the body;
 - a second laser source disposed adjacent to a second side of the body opposite the first side; and
 - a controller coupled to the first laser source and the second laser source.
9. The process chamber of claim 8, further comprising:
 - one or more pyrometers disposed adjacent to the body.
10. The process chamber of claim 9, further comprising:
 - an infrared imaging device disposed adjacent to the body and positioned to monitor a behavior of a melted material in the melt pool.

11. The process chamber of claim 10, further comprising:
one or more quartz crystal monitors disposed in the process volume adjacent to the plurality of substrates.
12. The process chamber of claim 11, wherein the one or more pyrometers, the infrared imaging device, and the one or more quartz crystal monitors are connected to the controller.
13. The process chamber of claim 8, further comprising:
a probe assembly, the probe assembly comprising:
an enclosure having a first end and a second end opposite the first end;
a flange coupling the first end coupled to an opening formed in the body of the process chamber;
a first window adjacent to the first end of the enclosure;
a second window opposite the first window, the second window adjacent to the first end of the enclosure;
a third laser source aligned with the first window;
a fourth laser source opposite the third laser source and aligned with the second window;
a shaft disposed in the enclosure; and
a test structure disposed on the first end of the shaft, the test structure adjacent to the first end of the enclosure.
14. The process chamber of claim 13, the probe assembly further comprising:
an actuator coupled to the shaft to extend the test structure into the plume and retract the test structure into the enclosure between the first window and the second window.
15. A process chamber, comprising:
a body defining a process volume therein;
a melt pool disposed in the process volume;

- one or more ingots disposed in the melt pool;
- one or more electron beam generators disposed on the body opposite the melt pool, each of the one or more electron beam generators aligned with one of the one or more ingots;
- a holder disposed in the process volume between the one or more electron beam generators and the melt pool;
- a plurality of substrates disposed on the holder;
- a plume generated by the one or more electron beam generators melting the one or more ingots in the melt pool, the plume surrounding the plurality of substrates; and
- a probe assembly, the probe assembly comprising:
 - an enclosure having a first end and a second end opposite the first end;
 - a flange coupling the first end to an opening formed in the body;
 - a first window adjacent to the first end of the enclosure;
 - a second window opposite the first window, the second window adjacent to the first end of the enclosure;
 - a first laser source aligned with the first window;
 - a second laser source opposite the first laser source and aligned with the second window;
 - a shaft disposed in the enclosure; and
 - a test structure disposed on the shaft, the test structure adjacent to the first end of the enclosure.

16. The process chamber of claim 15, further comprising:
an actuator coupled to the shaft; and
a controller coupled to the actuator.

17. The process chamber of claim 15, further comprising:
one or more pyrometers disposed adjacent to the body.

18. The process chamber of claim 17, wherein the first laser source and the second laser source are configured to measure a thickness of a coating deposited on the test structure.
19. The process chamber of claim 18, further comprising:
an infrared imaging device disposed adjacent to the body and positioned to monitor a behavior of a melted material in the melt pool.
20. The process chamber of claim 19, one or more quartz crystal monitors disposed in the process volume adjacent to the plurality of substrates.