We Claim:

1. An apparatus, comprising:

a chamber body;

a substrate support positioned within the chamber body;

a reflection measurement system positioned within the chamber body, the reflection measurement system including:

a light source positioned to direct light towards a substrate supporting surface of the substrate support;

a focus lens positioned to collect light reflected from the surface of a substrate placed on the substrate supporting surface; and

a beam splitter positioned to direct a first portion of the light collected by the focus lens to an emissometer which determines an emissivity of the substrate, and to direct a second portion of the light collected by the focus lens to an imaging device; and

a processing unit to determine a temperature of the substrate based upon the emissivity of the substrate.

2. The apparatus of claim 1, wherein the light source is a monochromatic light source.

3. The apparatus of claim 1, wherein the imaging device facilitates generation of a magnified image of a diffraction pattern of the collected light.

4. The apparatus of claim 3, wherein the imaging device is a CCD camera.

5. The apparatus of claim 1, further comprising a laser for directing light towards the surface of the substrate.

6. The apparatus of claim 1, wherein the laser and the light source are adapted to simultaneously direct light to the same area of the surface of the substrate.

7. The apparatus of claim 1, further comprising a substrate support positioned within the chamber body, the substrate support translatable in the X-Y directions relative to the reflection measurement system, and wherein the reflection measurement system is located in a fixed position within the chamber body

8. A method of determining the temperature of a substrate, comprising:

positioning a substrate having a 3D feature thereon on a substrate support within a chamber body;

directing light from a light source to a surface of the substrate;

reflecting the light from the surface of the substrate;

collecting the reflected light with a focus lens;

directing the reflected light from the focus lens to an emissometer;

determining an emissivity of the substrate; and

determining a temperature of the substrate based upon the emissivity of the substrate.

9. The method of claim 8, wherein the light directed to the surface of the substrate is monochromatic.

10. The method of claim 9, further comprising performing a laser annealing process simultaneously with the determining the temperature of the substrate.

11. The method of claim 9, further comprising performing an atomic layer deposition process simultaneously with the determining the temperature of the substrate.

12. The method of claim 8, further comprising:

deriving a temperature history of the substrate; and

translating the substrate on the substrate support relative to the light source and the focus lens.

13. A method of determining the temperature of a substrate, comprising:

positioning a substrate having a 3D feature thereon on a substrate support within a chamber body;

directing light from a light source to a surface of the substrate;

reflecting the light from the surface of the substrate;

collecting the reflected light with a focus lens;

directing the reflected light from the focus lens to a beam splitter;

splitting the reflected light into first and second paths, the first path directed towards an emissometer and the second path directed towards an imaging device;

determining an emissivity of the substrate; and

determining a temperature of the substrate based upon the emissivity of the substrate.

14. The method of claim 13, further comprising:

performing an atomic layer deposition process simultaneously with the determining the temperature of the substrate; and

monitoring a change in size of the 3D feature on the substrate during the atomic layer deposition process, wherein monitoring the change in size of the 3D feature includes generating a magnified image of a diffraction pattern of the reflected light.

15. The method of claim 13, further comprising:

performing a laser annealing process simultaneously with the determining the temperature of the substrate; and

deriving a temperature history of the substrate.

Claims

1. A method of determining the temperature of a substrate, comprising:

positioning a substrate having a 3D feature thereon on a substrate support within a chamber body;

directing light from a light source to a surface of the substrate;

reflecting the light from the surface of the substrate;

collecting the reflected light with a focus lens;

directing the reflected light from the focus lens to a beam splitter;

splitting the reflected light into first and second paths, the first path directed towards an emissometer and the second path directed towards an imaging device;

determining an emissivity of the substrate;

determining a temperature of the substrate based upon the emissivity of the substrate;

performing a laser annealing process simultaneously with the determining the temperature of the substrate; and

deriving a temperature history of the substrate.