CLAIMS

1. A thermal cycler apparatus, comprising:

a heat sink;

a plurality of peltier devices over the heat sink;

a pair of first and second base plates over each peltier device; and

a well block comprising a plurality of zones, each zone comprising first adjacent wells and second adjacent wells;

wherein each first adjacent wells and each second adjacent wells are respectively over the first base plate and the second base plate such that one peltier device provides for heat transfer for one; and

wherein the first base plate and the second base plate are separated from each other by a space through which wires extending from the peltier device extend.

2. The thermal cycler apparatus of claim 1, wherein each zone comprises 4 wells, each 4-well zone comprising a first pair of adjacent wells and a second pair of adjacent wells.

3. The thermal cycler apparatus of claim 1, wherein each peltier device is individually driven.

4. The thermal cycler apparatus of claim 1, wherein the plurality of peltier devices comprises at least 24 individually driven peltiers.

5. The thermal cycler apparatus of claim 4, wherein the at least 24 peltiers are individually driven to form a predetermined number of thermal zones in the well block.

6. The thermal cycler apparatus of claim 4, wherein the at least 24 peltiers are individually driven to form a temperature gradient across the well block.

7. The thermal cycler apparatus of claim 1, wherein each of the plurality of peltiers has a heat directing element that is connected to a printed circuit, wherein the printed circuit is connected to a resistance temperature detector.

8. The thermal cycler apparatus of claim 1, wherein each well plurality of 4-well zone has an average depth of about 0.3 inches.

9. The thermal cycler apparatus of claim 1, wherein the heat sink and the plurality of peltier devices are coupled to the plurality of 4-well zones of the well block via an elastomeric adhesive.

10. The thermal cycler apparatus of claim 1, wherein each well of the well block comprises a generally cylindrical portion located below a conical portion and above a flat bottom portion, and wherein the flat bottom portion is perpendicular to the generally cylindrical portion.

11. The thermal cycler apparatus of claim 10, wherein the conical portion forms an angle of about 16° with the cylindrical portion.

12. The thermal cycler apparatus of claim 10, wherein a wall of the generally cylindrical portion forms an angle with the flat bottom portion, the angle being between 90° and 95°.

13. The thermal cycler apparatus of any one of claims 10-12, wherein the flat bottom portion contacts the peltier device.

14. The thermal cycler apparatus of any one of claims 10-13, wherein the wells are each configured such that a conical sample well placed in each well cannot contact the flat bottom portion of the well.

15. The thermal cycler apparatus of any one of claims 10-14, wherein the wells are each configured such when a conical sample well, comprising a conical portion, is placed in each well, the conical portion of the sample well contacts the conical portion of the well.

16. The thermal cycler apparatus of any one of claims 10-15, wherein each flat bottom portion is coupled to a base plate.

17. The thermal cycler apparatus of any of the preceding claims, wherein the thermal cycler apparatus is provided in a housing, the housing further provided with an optics system.

18. The thermal cycler apparatus of any of the preceding claims, wherein the thermal cycler apparatus is provided with a computing device for controlling the thermal cycler apparatus.

19. The thermal cycler apparatus of any of the preceding claims, further provided with a robotics unit configured for loading samples into the thermal cycler apparatus.