desired temperature. If the bulk of the heat load is removed from the semiconductor wafer before using e.g. a thermal transfer plate to equalise the temperature of the semiconductor wafer to the temperature of the weighing apparatus, the heat load on the thermal transfer plate during the temperature equalisation will be low. Therefore, the temperature of the thermal transfer plate should not change significantly during the temperature equalisation, and the temperature of the semiconductor wafer will therefore be more accurately/precisely equalised to the desired temperature (i.e. the original temperature of the thermal transfer plate)

The heat load on the weighing apparatus during the temperature equalisation will be significantly reduced relative to the method described in WO 02/02449 if the bulk (e.g. the majority, or more than half) of the heat load of the semiconductor wafer is removed (e.g. the semiconductor wafer is cooled to a temperature close to the temperature of the weighing apparatus) before the temperature of the semiconductor wafer is equalised to the temperature of the weighing apparatus.

Therefore, the temperature of the weighing apparatus should not change significantly because of the temperature equalisation, even when performing sequential measurements on a plurality of semiconductor wafers having relatively high starting temperatures (e.g. 70°C or over). As such, the temperature of the semiconductor wafer when it is loaded on to a measurement area of the weighing apparatus and/or the temperature and/or the temperature uniformity of the measurement area of the weighing apparatus may be more accurately controlled, and as a consequence the accuracy of the weight measurements performed by the weighing apparatus may be improved.

The present inventors have also realised that the concept of removing the bulk of a heat load from a semiconductor wafer before equalising the temperature of the semiconductor wafer

CLAIMS

1. A semiconductor wafer processing method comprising:

controlling a temperature of a semiconductor wafer to be within a predetermined processing temperature range by:

causing a first change in the temperature of the semiconductor wafer using a first temperature changing unit; and

subsequently causing a second change in the temperature of the semiconductor wafer using a second temperature changing unit;

wherein a magnitude of the first change is greater than a magnitude of the second change; and

subsequently loading the semiconductor wafer on to a processing area of a semiconductor wafer processing apparatus;

characterised in that:

the second temperature changing unit comprises a thermal transfer plate that is thermally coupled to, or integral to, the processing area of the semiconductor wafer processing apparatus, so that the thermal transfer plate is substantially in thermal equilibrium with the processing area of the semiconductor wafer processing apparatus and has substantially the same temperature as the processing area of the semiconductor wafer processing apparatus.

2. The method according to claim 1, wherein the magnitude of the first temperature change comprises at least 80%, or at least 90%, or at least 95% of the sum of the magnitudes of the first and second temperature changes; and/or

wherein causing the first change in the temperature of the semiconductor wafer comprises changing the temperature of the semiconductor wafer to be within ±3°C, or within ±2°C, or within ±1°C of a predetermined processing temperature; and/or

wherein causing the second change in the temperature of the semiconductor wafer comprises changing the temperature of the semiconductor wafer by less than 3°C, or less than 2°C, or less than 1°C.

3. The method according to claim 1 or claim 2, wherein:

the temperature of the semiconductor wafer is controlled to be within a predetermined measurement temperature range; and

the semiconductor wafer is loaded on to a measurement area of a semiconductor wafer metrology apparatus.

4. The method according to any one of the previous claims, wherein:

the first temperature changing unit comprises a first cooling unit;

causing the first change in the temperature of the semiconductor wafer comprises cooling the semiconductor wafer using the first cooling unit;

the second temperature changing unit comprises a second cooling unit; and

causing the second change in the temperature of the semiconductor wafer comprises cooling the semiconductor wafer using the second cooling unit.

5. The method according to any one of the previous claims, wherein the method comprises:

transporting the semiconductor wafer from the second temperature changing unit to the processing area of the semiconductor wafer processing apparatus; and

controlling the temperature of the semiconductor wafer while it is being transported during the transporting step.

6. A semiconductor wafer processing method comprising:

controlling the temperature of a semiconductor wafer to be within a predetermined processing temperature range by causing a change in the temperature of the semiconductor wafer using a temperature changing unit; and

transporting the semiconductor wafer from the temperature changing unit to a processing area of a semiconductor wafer processing apparatus;

characterised in that:

the method comprises controlling the temperature of the semiconductor wafer while it is being transported during the transporting step to be substantially the same as the temperature of the semiconductor wafer as it leaves the temperature changing unit.

7. The method according to claim 6, wherein:

the semiconductor wafer is transported from the temperature changing unit to a measurement area of a semiconductor wafer metrology apparatus.

8. The method according to any one of claims 5 to 7, wherein the method comprises:

controlling the temperature of a semiconductor wafer transporter used to transport the semiconductor wafer; and/or

controlling the temperature of a volume of air through which the semiconductor wafer is transported.

9. A semiconductor wafer processing apparatus comprising:

a processing area;

a first temperature changing unit for causing a first change in the temperature of a semiconductor wafer; and

a second temperature changing unit for subsequently causing a second change in the temperature of the semiconductor wafer,

characterised in that:

the second temperature changing unit comprises a thermal transfer plate that is thermally coupled to, or integral to, the processing area, so that the thermal transfer plate is substantially in thermal equilibrium with

the processing area and has substantially the same temperature as the processing area.

10. The apparatus according to claim 9, wherein:

the apparatus comprises a semiconductor wafer metrology apparatus, and the processing area comprises a measurement area; and/or

the apparatus comprises a weighing apparatus.

11. The apparatus according to claim 9 or claim 10, wherein the first temperature changing unit comprises a first cooling unit for cooling the semiconductor wafer; and

the second temperature changing unit comprises a second cooling unit for cooling the semiconductor wafer.

12. The apparatus according to any one of claims 9 to 11, wherein the apparatus comprises:

a semiconductor wafer transporter for transporting the semiconductor wafer from the second temperature changing unit to the processing area of the semiconductor wafer processing apparatus; and

temperature control means for controlling the temperature of the semiconductor wafer while it is being transported during the transporting.

13. A semiconductor wafer processing apparatus comprising:

a temperature changing unit for causing a change in the temperature of a semiconductor wafer;

a semiconductor wafer transporter for transporting the semiconductor wafer from the temperature changing unit to a processing area of a semiconductor wafer processing apparatus;

characterised in that:

the wafer processing apparatus comprises temperature control means for controlling the temperature of the

semiconductor wafer while it is being transported during the transporting, wherein the temperature control means is configured to control the temperature of the semiconductor wafer to be substantially the same as the temperature of the semiconductor wafer as it leaves the temperature changing unit.

14. The apparatus according to claim 13, wherein:

the apparatus comprises a semiconductor wafer metrology apparatus; and

the semiconductor wafer transporter is for transporting the semiconductor wafer from the temperature changing unit to a measurement area of the semiconductor wafer metrology apparatus.

15. The apparatus according to any one of claims 12 to 14, wherein the apparatus comprises a first further temperature changing unit arranged to change the temperature of the semiconductor wafer transporter; and/or

wherein the apparatus comprises a second further temperature changing unit arranged to change the temperature of a volume of air through which the semiconductor wafer is transported.

16. The apparatus according to claim 15, wherein the apparatus comprises:

a temperature sensor and a controller, wherein:

the controller is arranged to control the first and/or second further temperature changing unit based on an output of the temperature sensor; or

the apparatus comprises a fan arranged to blow air across the second further temperature changing unit to change the temperature of the volume of air through which the semiconductor wafer is transported, and the controller is arranged to control the fan based on an output of the temperature sensor.