Claims

1. Crucible for the production of crystalline semiconductor ingots, said crucible comprising an inner volume defined by a floor which top surface comprises a planar portion defining a first horizontal plane and peripheral side walls each comprising an inner surface comprising a planar portion vertical, defining a vertical plane, and normal to the first, horizontal plane, said side walls joining the floor at the perimeter of the latter by forming a radius of curvature, R1, of at least 1 mm, characterized in that, the intersecting line forming the intersection between the first, horizontal plane and the vertical planes defined by the vertical planar portions of each side wall is entirely located on the side walls, on the floor, or in the inner volume of the crucible.

2. Crucible according to claim 1, wherein the radius R1 along the joint between floor and side walls is defined by a groove of width, L1, and depth, d1 extending along the perimeter of the floor and formed on the floor and/or the side walls, and wherein the groove radius, R1, is preferably comprised between 5 and 25 mm, the groove width, L1, is preferably comprised between 5 and 30 mm, and/or the groove depth, d1, is preferably comprised between 1 and 8 mm.

3. Crucible according to claim 1 or 2, wherein the floor comprises a floor groove extending along the perimeter of the former, and preferably joining with a radius of curvature, R2, the portion of the floor which is coplanar with the horizontal plane.

4. Crucible according to claim 2 or 3, wherein all the side walls comprise a side groove extending along the perimeter of the floor, and joining with a radius of curvature, R3, the portion of each side wall which is coplanar with the vertical plane.

5. Crucible according to any of the preceding claims, wherein two adjacent side walls form a corner having a radius, R4, defined by a corner groove formed on one or both adjacent side walls extending upwards from the floor along the corner between said two adjacent walls, the corner groove extending preferably from the floor to the top of the side walls.

6. Crucible according to any of the preceding claims, wherein the floor and/or the side walls are coated with a coating material.

7. Crucible according to any of claims 2 to 6, wherein the floor comprises a floor groove extending along the perimeter of the former, said floor groove being filled with a filling material such that the filing material is flush with the horizontal plane, wherein said filling material is

preferably selected from the group of silicon nitride (Si_3N_4), sialon, silicon oxynitride, fused quartz or fused silica, synthetic silica, silicon metals, graphite, alumina, natural or synthetic CaO-, SiO_2-, Al_2O_3-, MgO-, ZrO_2-based ceramic materials in the form of:

- a low density layer, like a foam, of density preferably comprised between 0.3 and 1.6 g/cm^3, more preferably between 0.8 and 1.3 g/cm^3, or
- particulate, such as fibres, hollow shells, nanoparticles, meso-spherous particles, and mixtures thereof, each of the foregoing materials preferably having an Fe content of less than 20 ppm, more preferably less than 5 ppm, most preferably less than 1 ppm.

8. Crucible according to claims 6 and 7, wherein the floor is coated with a coating material which is the same as the filling material filling the floor groove.

9. Crucible according to any of the preceding claims, wherein the floor is tiled with at least one crystallization seed, preferably, substantially the whole area of the floor is tiled with more than one crystallization seeds.

10. Crucible according to the preceding claim, wherein the crystallization seeds extend over a portion of the floor groove.

11. Use of a crucible according to any of the preceding claims, for the production of a crystalline semiconductor ingot, preferably of a silicon ingot, more preferably of a quasi-monocrystalline silicon ingot.

12. Process for the manufacturing of a crystalline semiconductor wafer comprising the following steps:

(a) providing a crucible according to any of claims 1 to 10;
(b) forming a crystalline semiconductor ingot in said crucible by a Bridgman technique, wherein the semiconductor is preferably silicon;
(c) extracting the ingot from said crucible and trimming off any defective layer; and
(d) slicing the thus trimmed ingot to form semiconductor wafers.

Claims.

1. Crucible (1) for the production of crystalline semiconductor ingots, said crucible comprising an inner volume defined by a floor (1a) which top surface comprises a planar portion defining a first horizontal plane (H) and peripheral side walls (1b) each comprising an inner surface comprising a planar portion substantially vertical, defining a substantially vertical plane (V), and normal to the first, horizontal plane (H), said side walls (1b) joining the floor (1a) at the perimeter of the latter by forming a radius of curvature, R1, of at least 1 mm, **characterized in that**, the intersecting line (hv) forming the intersection between the first, horizontal plane (H) and the substantially vertical planes (V) defined by the substantially vertical planar portions of each side wall (1b) is entirely located on the side walls (1b), on the floor (1a), or in the inner volume of the crucible.

2. Crucible according to claim 1, wherein the radius R1 along the joint between floor (1a) and side walls (1b) is defined by a groove (8a, 8b) of width, L1 (L1a, L1b), and depth, d1 (d1a, d1b) extending along the perimeter of the floor (1a) and formed on the floor (1a) and/or the side walls (1b), and wherein the groove radius, R1, is preferably comprised between 5 and 25 mm, the groove width, L1, is preferably comprised between 5 and 30 mm, and/or the groove depth, d1, is preferably comprised between 1 and 8 mm.

3. Crucible according to claim 1 or 2, wherein the floor (1a) comprises a floor groove (8a) extending along the perimeter of the former, and preferably joining with a radius of curvature, R2, the portion of the floor (1a) which is coplanar with the horizontal plane (H).

4. Crucible according to claim 2 or 3, wherein all the side walls (1b) comprise a side groove (8b) extending along the perimeter of the floor (1a), and joining with a radius of curvature, R3, the portion of each side wall (1b) which is coplanar with the vertical plane (V).

5. Crucible according to any of the preceding claims, wherein two adjacent side walls (1b) form a corner having a radius, R4, defined by a corner groove formed on one or both adjacent side walls (1b) extending upwards from the floor along the corner between said two adjacent walls, the corner groove extending preferably from the floor to the top of the side walls (1b).

6. Crucible according to any of the preceding claims, wherein the floor (1a) and/or the side walls (1b) are coated with a coating material.

7. Crucible according to any of claims 2 to 6, wherein the floor (1a) comprises a floor groove (8a) extending along the perimeter of the former, said floor groove (8a) being filled with a filling material such that the filling material is flush with the horizontal plane

(H), wherein said filling material is preferably selected from the group of silicon nitride (Si_3N_4), sialon, silicon oxynitride, fused quartz or fused silica, synthetic silica, silicon metals, graphite, alumina, natural or synthetic CaO-, SiO_2-, Al_2O_3-, MgO-, ZrO_2-based ceramic materials in the form of:

- a low density layer, like a foam, of density preferably comprised between 0.3 and 1.6 g/cm³, more preferably between 0.8 and 1.3 g/cm³, or
- particulate, such as fibres, hollow shells, nanoparticles, meso-spherous particles, and mixtures thereof, each of the foregoing materials preferably having an Fe content of less than 20 ppm, more preferably less than 5 ppm, most preferably less than 1 ppm.

8. Crucible according to claims 6 and 7, wherein the floor (1a) is coated with a coating material which is the same as the filling material filling the floor groove (8a).

9. Crucible according to any of the preceding claims, wherein the floor (1a) is tiled with at least one crystallization seed (3), preferably, substantially the whole area of the floor (1a) is tiled with more than one crystallization seeds (3).

10. Crucible according to the preceding claim, wherein the crystallization seeds (3) extend over a portion of the floor groove (8a).

11. Use of a crucible according to any of the preceding claims, for the production of a crystalline semiconductor ingot, preferably of a silicon ingot, more preferably of a quasi-monocrystalline silicon ingot.

12. Process for the manufacturing of a crystalline semiconductor wafer comprising the following steps:

(a) providing a crucible according to any of claims 1 to 10;

(b) forming a crystalline semiconductor ingot in said crucible by a Bridgman technique, wherein the semiconductor is preferably silicon;

(c) extracting the ingot from said crucible and trimming off any defective layer; and

(d) slicing the thus trimmed ingot to form semiconductor wafers.