Claims.

1. Crucible ~~(1)~~ for the production of crystalline semiconducting material ingots, such as silicon, said crucible comprising peripheral side walls ~~(1b)~~ and a floor ~~(1a)~~ at least a portion of said floor being coated with a top layer ~~(2)~~, characterized in that, said top layer ~~(2)~~ has a thickness, δ, of at least 500 µm and in that, at a deformation temperature below 1400°C said top layer is plastically or viscously deformable.

2. Crucible according to claim 1, wherein the top layer ~~(2)~~ comprises one or more of silicon nitride (Si_3N_4), sialon, silicon oxynitride, siloxane, silazane, fused quartz or fused silica, synthetic silica, 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 non-woven fibres, hollow shells, nanoparticles, meso-spherous particles,
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.

3. Crucible according to the preceding claim, wherein the top layer comprises at least two layers of different materials, the uppermost layer being preferably made of silicon nitride (Si_3N_4).

4. Crucible according to any of the preceding claims, wherein the density of the top layer ~~(2)~~ is at least 20% lower than the density of the inner surfaces of the other walls defining the inner volume of the crucible.

5. Crucible according to the preceding claim, wherein the floor ~~(1a)~~ joins the side walls ~~(1b)~~ of the crucible forming a radius, R, and wherein the thickness, δ, of the top layer ~~(2)~~ is larger than the radius, R.

6. Crucible according to any of the preceding claims, wherein at least one crystallization seed ~~(3)~~ is impressed in the top layer ~~(2)~~ and preferably at least two crystallization seeds ~~(3)~~ are impressed in the top layer ~~(2)~~, with their top surfaces being substantially co-planar.

7. Crucible according to the preceding claim, wherein the at least two crystallization seeds have a different thickness and are preferably silicon seeds, more preferably monocrystalline silicon seeds.

8. Process for producing an oriented crystalline semiconductor material ingot comprising the following steps:
- providing a crucible according to any of claims 1 to 7,

- laying at least one crystallization seed ~~(3)~~ onto the top layer ~~(2)~~;
- bringing the temperature of the top layer to the deformation temperature thereof;
- applying a pressure onto the at least one crystallization seed to impress it into the top layer ~~(2)~~ such that it sinks at least partially into the deformable top layer ;
- filling the crucible with a load of semiconductor material feedstock;
- controlling the temperature in the crucible to melt completely the feedstock and to melt the top surface only of the at least one crystallization seed;
- extracting heat through the floor of the crucible to prevent the bottom surface of the at least one crystallization seed from melting and to initiate the oriented crystallization of the feedstock.

9. Process according to the preceding claim, wherein pressure is applied to the at least one crystallization seed by controlling the length of a rigid vertical stem from a first end thereof contacting one crystallization seed to a fixed point, such as the upper edge of the crucible, or any fixed point inside or outside the crucible.

10. Process according to claim 8 or 9, wherein the top layer ~~(2)~~ covers the whole area of the crucible floor ~~(1a)~~, and at least two crystallization seeds are tiled side by side to cover substantially the whole area of the top layer ~~(2)~~, such that the top surfaces of said at least two crystallization seeds are substantially coplanar.

11. Process according to the preceding claim, wherein,
- for a given furnace, the temperature distribution over the area of the top surface of the at least two crystallization seeds is characterized during the heat extraction step;
- a mapping of hot and cold spots is established over the whole top surface area of the seeds as a function of the position of each of the at least two crystallization seeds;
- the thickness of each of the at least two crystallization seeds is determined such as to allow the homogenization of the temperature distribution over the whole top surface area of the seeds during the heat extraction step in said furnace;
- tile the crucible floor ~~(1a)~~ with the at least two crystallization seeds of thus determined thicknesses in their corresponding positions;
- load the crucible with a feedstock and carry out the necessary steps for melting and crystallizing the feedstock to form an oriented crystalline semiconductor material ingot.

12. Process according to any of claims 8 to 11, wherein the one or more crystallization seeds are monocrystalline and the ingot thus crystallized is substantially monocrystalline or near monocrystalline.

13. Process according to any of claims 8 to 12, wherein the one or more crystallization seeds are silicon, preferably monocrystalline silicon, and the feedstock is composed of silicon and doping materials used in the production silicon ingots, and wherein the crystalline silicon ingot thus obtained is further treated to produce solar cells.

14. Process for manufacturing a crucible according to any of claims 1 to 7 comprising the following steps:

- manufacturing a crucible made of a silicon oxide based refractory material and comprising a floor ~~(1a)~~ and side walls ~~(1b)~~;
- optionally applying one or more coatings to the inner surfaces of the floor ~~(1a)~~ and/or side walls ~~(1b)~~ of said crucible;
- applying to the floor ~~(1a)~~ by spraying, rolling, casting, brushing, or any combination thereof, a top layer ~~(2)~~ of thickness, δ, of at least 500 µm, said top layer being plastically or viscously deformable at a deformation temperature below 1400°C.