CLAIMS

1. A method for fabricating a semi-conductor body, the method comprising the steps of:

a. providing a molten semi-conductor material, having a surface;

b. providing a porous mold, comprising a forming surface;

c. providing a free-standing ceramic sheet between the forming surface and the molten material;

d. contacting the forming surface to the ceramic sheet and the ceramic sheet to the surface of the molten material for a contact duration, such that a body of semi-conductor material, solidifies upon the ceramic sheet; and

e. removing the solidified body from contact with the molten semi-conductor material while still contacting the ceramic sheet.

2. The method of claim 1, the semiconductor material comprising silicon.

3. The method of claim 2, the silicon body comprising a solar cell element.

4. The method of claim 1, further comprising:
providing a differential pressure regime such that pressure at at least a portion of the forming surface is less than pressure at the molten material surface, such that, for at least a portion of the contact duration, the differential pressure regime exists.

5. The method of claim 1, further comprising the step of providing at least a portion of the forming surface at a temperature below a melting point of the semi-conductor material for at least a portion of the contact duration.

6. The method of claim 4, further comprising the step of reducing the degree of the differential pressure regime, thereby contributing to detaching from the forming surface at least one of the ceramic sheet and the solidified body.

7. The method of claim 1, the step of providing the ceramic sheet comprising providing the ceramic sheet upon the molten material.

8. The method of claim 1, the step of providing the ceramic sheet comprising providing the ceramic sheet upon the forming surface.

9. The method of claim 8, further comprising the step of clamping the ceramic sheet to the forming surface.

10. The method of claim 9, further comprising the step of providing at least one additional ceramic sheet between the forming surface and the molten material.

11. The method of claim 9, the step of clamping the ceramic sheet comprising clamping the ceramic sheet such that the ceramic sheet hangs away from the forming surface such that the ceramic sheet contacts the molten material at a contact location and afterwards, the forming surface contacts the ceramic sheet obverse of the contact location.

12. The method of claim 11, the contact location comprising the center of the ceramic sheet.

13. The method of claim 10, two of the at least two ceramic sheets having different compositions from each other.

14. The method of claim 10, at least two adjacent ceramic sheets being composed of materials that do not adhere strongly to each other.

15. The method of claim 13, at least one ceramic sheet having a nucleation propensity that is relatively lower than at least one other ceramic sheet.

16. The method of claim 13, at least one ceramic sheet having a resistance to heat transfer that is relatively larger than that of at least one other ceramic sheet.

17. The method of claim 8, further comprising the step of securing the ceramic sheet to the forming surface by providing a differential pressure regime such that pressure at at least a portion of the forming surface is less than pressure at a face of the ceramic sheet facing away from the forming surface.

18. The method of claim 1, the ceramic sheet comprising a porous sheet.

19. The method of claim 1, the ceramic sheet being selected from the group consisting of: silica, silicon nitride, silicon oxynitride, silicon oxycarbide, silicon carbide, silicon carbonitride and silicon oxycarbonitride.

20. The method of claim 1, the ceramic sheet having a mass equivalent thickness of between approximately 1 and approximately 15 microns.

21. The method of claim 1, the ceramic sheet having a mass equivalent thickness between approximately 2 and approximately 5 microns.

22. The method of claim 1, the ceramic sheet being flexible.

23. The method of claim 22, the flexibility of the ceramic sheet being characterized by an ability of the sheet to be curved to a radius of less than approximately 325 mm and preferably of less than approximately 150 mm, and most preferably of less than 2 mm, without developing any fracture.

24. The method of claim 1, the ceramic sheet being porous.

25. The method of claim 24, the degree of porosity being from approximately 1 percent to as high as approximately 80%.

26. The method of claim 24, the ceramic sheet having openings having a diameter of between approximately 1 microns and approximately 100 microns.

27. The method of claim 1, further comprising the step of electrically charging the ceramic sheet relative to the forming surface, and attaching the ceramic sheet to the forming surface by establishing a voltage on the forming surface.

28. The method of claim 1, the ceramic sheet having less than approximately 5 ppmw of transition metals.

29. The method of claim 1, the ceramic sheet being capable to withstand a temperature of at least approximately 1400C without degradation for a contact

duration sufficient for solidification of a silicon semiconductor body.

30. The method of claim 1, the ceramic sheet comprising fused material.

31. The method of claim 1, the ceramic sheet comprising sintered material.

32. The method of claim 30, the fused material fused from needle-shaped particles.

33. The method of claim 30, the fused material fused from equiaxed particles.

34. The method of claim 1, the material of the ceramic sheet having a lower potential to nucleate grains of the semiconductor than the material of the forming surface.

35. A free-standing porous ceramic body comprising an interconnected network of a material, having a ME thickness of less than 10 microns and a first surface and an obverse surface, the solid material being able to withstand contact with a molten semiconductor at at least about 1400C for a contact duration sufficient to form a semconductor body and having less than about 5 ppmw transition metals.

36. The body of claim 35, the network of material defining openings having a diameter of beteeen approximately 1 microns and about 100 microns.

37. The body of claim 35, the network of material having a porosity of between approximately 1 % and approximately 80%.

38. The body of claim 35, the material being selected from the group consisting of: silica, silicon nitride, silicon oxynitride, silicon oxycarbide, silicon carbide,

silicon carbonitride, silicon oxycarbonitride, alumina, mullite and boron nitride.

39. The body of claim 35, the material having a lower propensity to nucleate grains of semiconductor material than graphite.

40. The body of claim 35, further comprising a second such body, the first and second bodies being composed of bodies that do not adhere strongly to each other.

41. An assembly comprising:

a. a porous mold, comprising a forming surface;

b. a free-standing porous refractory ceramic sheet having a first and second surface, being secured at the first surface to the forming surface of the mold; and

c. secured to the second surface of the ceramic sheet, a semiconductor body formed directly from a molten quantity of semiconductor material.

42. The assembly of claim 41, further comprising a second ceramic sheet between and secured to each of the first ceramic sheet and the forming surface.

43. The assembly of claim 42, the first and second ceramic sheets having compositions that differ from each other.

44. An apparatus for fabricating a semiconductor body from a molten supply of semiconductor material, the apparatus comprising:

a. a porous mold, comprising a forming surface;

b. a holding mechanism configured to hold a free-standing ceramic sheet facing the forming surface, such that the ceramic sheet hangs away from the forming surface such that the ceramic sheet can contact a surface of molten material at a contact location and such that the forming surface can be brought to contact the ceramic sheet obverse of the contact location; and

c. a structure configured to provide a differential pressure regime such that pressure at the contact location is less than pressure at the surface of molten material.

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c. providing a free-standing ceramic sheet between the forming surface and the molten material;

d. contacting the forming surface to the ceramic sheet and the ceramic sheet to the surface of the molten material for a contact duration, such that heat is extracted from the molten material so that a body of semi-conductor material, solidifies upon the ceramic sheet; and

e. removing the solidified body from contact with the molten semi-conductor material while still contacting the ceramic sheet.

2. The method of claim 1, the semiconductor material comprising silicon.

3. The method of claim 2, the silicon body comprising a solar cell element.

4. The method of claim 1, further comprising:
providing a differential pressure regime such that pressure at at least a portion of the forming surface is less than pressure at the molten material surface, such that, for at least a portion of the contact duration, the differential pressure regime exists.

5. The method of claim 1, further comprising the step of providing at least a portion of the forming surface at a temperature below a melting point of the semi-conductor material for at least a portion of the contact duration.

6. The method of claim 4, further comprising the step of reducing the degree of the differential pressure regime, thereby contributing to detaching from the forming surface at least one of the ceramic sheet and the solidified body.

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29. The method of claim 1, the ceramic sheet being capable to withstand a temperature of at least approximately 1400C without degradation for a contact

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34. The method of claim 1, the material of the ceramic sheet having a lower potential to nucleate grains of the semiconductor than the material of the forming surface.

35. A free-standing porous ceramic body comprising an interconnected network of a solid material, having a ME thickness of less than 10 microns and a first surface and an obverse surface, the solid material being able to withstand contact with a molten semiconductor at at least about 1400C for a contact duration sufficient to form a semiconductor body and having less than about 5 ppmw transition metals, the porosity being sufficiently open to allow a pressure differential to propagate through the body from the first surface to the obverse surface.

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37. The body of claim 35, the network of material having a porosity of between approximately 1 % and approximately 80%.

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44. An apparatus for fabricating a semiconductor body from a molten supply of semiconductor material, the apparatus comprising:

a. a porous mold, comprising a forming surface;

b. a holding mechanism configured to hold a free-standing ceramic sheet facing the forming surface, such that the ceramic sheet hangs away from the forming surface such that the ceramic sheet can contact a surface of molten material at a contact location and such that the forming surface can be brought to contact the ceramic sheet obverse of the contact location; and

c. a structure configured to provide a differential pressure regime such that pressure at the contact location is less than pressure at the surface of molten material.