CLAIMS:

1. A method for forming a unitized crucible assembly for holding a melt of silicon for forming a silicon ingot by the Czochralski method, the unitized crucible assembly comprising a bottom, an outer sidewall that extends upward from the bottom, a central weir that extends upward from the bottom, and an inner weir that extends upward from the bottom, the central weir being disposed between the outer sidewall and the inner weir, the method comprising:

providing a crucible mold, the mold having a channel network comprising:

a bottom channel;

an outer sidewall channel that extends from the bottom channel;

a central weir channel that extends from the bottom channel;

an inner weir channel that extends from the bottom channel, the central weir channel being disposed between the outer sidewall channel and the inner weir channel;

a central weir peg that extends through the central weir channel to form an opening in the central weir of the unitized crucible assembly to allow silicon melt to pass through the central weir; and

an inner weir peg that extends through the inner weir channel to form an opening in the inner weir of the unitized crucible assembly to allow silicon melt to pass through the inner weir;

introducing a slip slurry into the channel network to fill the bottom channel, outer sidewall channel,

central weir channel, and inner weir channel with the slip slurry, the slip slurry comprising silica and a liquid carrier;

removing at least a portion of the liquid carrier from the channel network to form a green body;

separating the green body from the crucible mold; and

sintering the green body to dry and densify the green body to form the unitized crucible assembly.

2. The method as set forth in claim 1 wherein the mold comprises a porous body and draws the liquid carrier into the mold by capillary action.

3. The method as set forth in claim 2 wherein the porous body is made of porous silica.

4. The method as set forth in claim 1 wherein a moisture content of the green body is less than about 50 wt%.

5. The method as set forth in claim 1 wherein the green body is sintered at a temperature from about 1200°C to about 1800°C.

6. The method as set forth in claim 1 wherein the bottom channel, outer sidewall channel, central weir channel and inner weir channel are each fluidly connected to each other.

7. The method as set forth in claim 6 wherein the bottom channel is rounded and the unitized crucible assembly is transparent and includes a single layer bottom.

8. A method for growing a single crystal silicon ingot comprising:

providing a unitized crucible assembly by the method of claim 1;

adding polycrystalline silicon to a crucible melt zone disposed between the outer sidewall and the central weir to form a silicon melt, the silicon melt flowing through the central weir opening to a stabilization zone disposed between the central weir and the inner weir, the silicon melt flowing through the inner weir opening to a growth zone disposed within the inner weir;

contacting the silicon melt within the growth zone with a seed crystal; and

withdrawing the seed crystal from the silicon melt to form a single crystal silicon ingot.

9. The method as set forth in claim 1 wherein the slip slurry and/or mold are selected to form a unitized crucible assembly having a concentration of calcium of less than about 1 ppmw, a concentration of sodium of less than about 0.5 ppmw, a concentration of potassium of less than about 0.5 ppmw, a concentration of lithium of less than about 0.5 ppmw, and a concentration of iron of less than about 0.5 ppmw.

10. A method for forming a unitized crucible assembly for holding a melt of silicon for forming a silicon ingot by the Czochralski method, the unitized crucible assembly comprising a bottom, an outer sidewall that extends upward from the bottom, and an inner weir that extends upward from the bottom, the inner weir being disposed radially inward of the outer sidewall, the method comprising:

providing a crucible mold, the mold comprising a porous body and a channel network disposed within the porous body, the channel network comprising:

a bottom channel;

an outer sidewall channel that extends from the bottom channel;

an inner weir channel that extends from the bottom channel, the inner weir channel being disposed interior to the outer sidewall channel; and

an inner weir peg that extends through the inner weir channel to form an opening in the inner weir of the unitized crucible assembly to allow silicon melt to pass through the inner weir;

introducing a slip slurry into the channel network to fill the bottom channel, outer sidewall channel and inner weir channel with the slip slurry, the slip slurry comprising silica and a liquid carrier;

drawing at least a portion of the liquid carrier into the mold by capillary action to form a green body;

separating the green body from the crucible mold; and

sintering the green body to dry and densify the green body to form the unitized crucible assembly.

11. The method as set forth in claim 10 wherein the mold comprises a porous body and draws the liquid carrier into the mold by capillary action.

12. The method as set forth in claim 11 wherein the porous body is made of porous silica.

13. The method as set forth in claim 10 wherein a moisture content of the green body is less than about 50 wt%.

14. The method as set forth in claim 10 wherein the bottom channel, outer sidewall channel, and inner weir channel are each fluidly connected to each other.

15. The method as set forth in claim 14 wherein the bottom channel is rounded and the unitized crucible assembly is transparent and includes a single layer bottom.

16. The method as set forth in claim 10 wherein the slip slurry and/or crucible mold are selected to form a unitized crucible assembly having a concentration of calcium of less than about 1 ppmw, a concentration of sodium of less than about 0.5 ppmw, a concentration of potassium of less than about 0.5 ppmw, a concentration of lithium of less than about 0.5 ppmw, and a concentration of iron of less than about 0.5 ppmw.

17. A crucible mold comprising:

a lower portion;

an upper portion disposed above the lower portion, the upper portion forming:

a central weir channel; and

an inner weir channel;

wherein the upper portion and lower portion together form:

a bottom channel; and

a sidewall channel fluidly connected to the bottom channel, wherein the central weir channel and inner weir channel extend from the bottom channel; and

a central weir peg that extends laterally across the central weir channel to form an opening in a central weir of a crucible formed from the mold.

18. The crucible mold as set forth in claim 17 wherein the upper portion comprises a flange, the flange resting on the lower portion.

19. The crucible mold as set forth in claim 17 wherein the crucible mold is porous.

20. The crucible mold as set forth in claim 19 wherein the crucible mold is made of porous silica.

21. The crucible mold as set forth in claim 17 comprising an inner weir peg that extends laterally across the inner weir channel to form an opening in an inner weir of a crucible formed from the mold.

22. The crucible mold as set forth in claim 17 wherein the bottom channel is rounded.

23. The crucible mold as set forth in claim 17 wherein the upper portion has a main body having lower surface and the lower portion has a main body having an upper surface, the lower and upper surfaces forming the bottom channel and the sidewall channel.

24. The crucible mold as set forth in claim 23 wherein the upper portion comprises a flange that extends from the main body of the upper portion, the flange resting on the main body of the lower portion.

25. The crucible mold as set forth in claim 23 wherein at least a portion of the lower surface is rounded and at least portion of the upper surface is rounded.