CLAIMS:

1. A method for growing a single crystal silicon ingot in a continuous Czochralski process in an ingot puller apparatus, the ingot puller apparatus comprising a housing defining a growth chamber, a crucible assembly disposed in the growth chamber, a silicon feed tube for adding solid silicon to the crucible assembly, the method comprising:

forming a melt of silicon in a crucible assembly;

applying heat to the melt in a stabilization phase;

introducing an inert gas into the silicon feed tube at a first inert gas feed rate during the stabilization phase, inert gas being passing through the silicon feed tube and into the growth chamber during the stabilization phase;

contacting a surface of the melt with a seed crystal;

withdrawing a single crystal silicon ingot from the melt in an ingot growth phase; and

introducing the inert gas into the silicon feed tube at a second inert gas feed rate during the ingot growth phase, the first inert gas feed rate being greater than the second inert gas feed rate, inert gas being passing through the silicon feed tube and into the growth chamber during the ingot growth phase.

2. The method as set forth in claim 1 wherein a ratio of the first inert gas feed rate to the second inert gas feed rate is at least 5:4.

3. The method as set forth in claim 1 wherein the first inert gas feed rate is greater than 3 slpm and the second inert gas feed rate is from 1 slpm to 3 slpm.

4. The method as set forth in claim 1 wherein the inert gas is argon.

5. The method as set forth in claim 1 wherein the silicon feed tube is disposed below a funnel, the inert gas flowing through the funnel into the silicon feed tube.

6. The method as set forth in claim 5 wherein the ingot puller apparatus comprises a silicon feed system comprising a feed tray, the silicon feed system being sealed, the inert gas being introduced into the silicon feed system from an inert gas feed vessel.

7. The method as set forth in claim 1 wherein the crucible assembly comprises a weir and a sidewall that define an outer melt zone between the weir and the sidewall, the method comprising introducing silicon to the silicon feed tube while withdrawing a single crystal silicon ingot from the melt, silicon passing through the silicon feed tube and entering the outer melt zone.

8. The method as set forth in claim 1 wherein the stabilization phase extends at least between formation of the melt and contacting the surface of the melt with the seed crystal.

9. The method as set forth in claim 8 wherein the stabilization phase comprises meltdown of silicon disposed in the crucible assembly.

10. A method for growing a single crystal silicon ingot in a continuous Czochralski process in an

ingot puller apparatus, the ingot puller apparatus comprising a housing defining a growth chamber, a crucible assembly disposed in the growth chamber, a silicon feed tube for adding solid silicon to the crucible assembly, the method comprising:

forming a melt of silicon in a crucible assembly;

applying heat to the melt in a stabilization phase;

introducing an inert gas into the silicon feed tube at a first inert gas feed rate during the stabilization phase, the first inert gas feed rate being between 2.5 and 3.5 slpm, inert gas being passing through the silicon feed tube and into the growth chamber during the stabilization phase;

contacting a surface of the melt with a seed crystal;

withdrawing a single crystal silicon ingot from the melt in an ingot growth phase; and

introducing the inert gas into the silicon feed tube at a second inert gas feed rate during the ingot growth phase, the second inert gas feed rate being between 2.5 and 3.5 slpm, inert gas passing through the silicon feed tube and into the growth chamber during the ingot growth phase.

11. The method as set forth in claim 10 wherein the inert gas is argon.

12. The method as set forth in claim 10 wherein the first and second inert gas feed rates are each about 3.0 slpm.

13. The method as set forth in claim 1 wherein a ratio of the first inert gas feed rate to the second inert gas feed rate is at least 4:3.

14. The method as set forth in claim 1 wherein a ratio of the first inert gas feed rate to the second inert gas feed rate is at least 2:1.

15. An ingot puller apparatus for manufacturing a single crystal silicon ingot, the ingot puller apparatus comprising:

a crucible assembly for holding a silicon melt;

a crystal puller housing that defines a growth chamber for pulling a silicon ingot from the melt, the crucible assembly being disposed within the growth chamber;

a silicon feed tube for adding solid silicon to the crucible assembly, the silicon feed tube extending into the growth chamber;

a funnel that at least partially extends into the silicon feed tube, the funnel and silicon feed tube being separated by a gap; and

a flange that extends radially from the funnel, the flange extending across at least a portion of the gap to reduce backflow of gases from the silicon feed tube into the growth chamber, the flange being disposed above the silicon feed tube and contacting an upper end of the silicon feed tube, the funnel extending through the flange.

16. The ingot puller apparatus as set forth in claim 15 wherein the flange is a quartz ring.

17. The ingot puller apparatus as set forth in claim 15 wherein the silicon feed tube comprises a

receiving portion and a main portion having a diameter less than the receiving portion, the funnel being at least partially disposed within the receiving portion.

18. The ingot puller apparatus as set forth in claim 15 wherein the flange and crystal puller housing are separated by a gap.

19. An ingot puller apparatus for manufacturing a single crystal silicon ingot, the ingot puller apparatus comprising:

a crucible assembly for holding a silicon melt;

a crystal puller housing that defines a growth chamber for pulling a silicon ingot from the melt, the crucible assembly being disposed within the growth chamber;

a silicon feed tube for adding solid silicon to the crucible assembly, the silicon feed tube extending into the growth chamber;

a funnel that at least partially extends into the silicon feed tube, the funnel and silicon feed tube being separated by a gap; and

a flange that extends radially from a lower end of the funnel, the flange extending across at least a portion of the gap to reduce backflow of gases from the silicon feed tube into the growth chamber, the flange being disposed within the silicon feed tube, the flange having an opening through which solid silicon passes.

20. The ingot puller apparatus as set forth in claim 19 wherein the flange only partially extends across the gap.

21. The ingot puller apparatus as set forth in claim 19 wherein the flange is made of quartz.

22. An ingot puller apparatus for manufacturing a single crystal silicon ingot, the ingot puller apparatus comprising:

a crucible assembly for holding a silicon melt;

a crystal puller housing that defines a growth chamber for pulling a silicon ingot from the melt, the crucible assembly being disposed within the growth chamber;

a silicon feed tube for adding solid silicon to the crucible assembly, the silicon feed tube extending into the growth chamber;

a funnel that at least partially extends into the silicon feed tube, the funnel and silicon feed tube being separated by a gap; and

a flange that extends radially from the funnel, the flange extending across at least a portion of the gap to reduce backflow of gases from the silicon feed tube into the growth chamber, the flange being disposed within the silicon feed tube.

23. The ingot puller apparatus as set forth in claim 22 wherein the flange is a quartz ring.