CLAIMS:

1. An ingot puller apparatus for producing a silicon ingot comprising:

a crucible for holding a melt of silicon;

a growth chamber for pulling a silicon ingot from the melt; and

a dopant conduit for introducing dopant into the melt, the dopant conduit having a length and comprising:

one or more sidewalls, the one or more sidewalls forming a conduit chamber through which dopant passes, the conduit chamber having a width;

an inlet through which solid dopant is introduced into the dopant conduit;

an outlet through which a gaseous dopant is discharged through the dopant conduit; and

a partition member disposed between the inlet and the outlet and supporting solid dopant introduced through the inlet, the partition member extending across the width of the conduit chamber, the partition member being porous to allow sublimed dopant to pass through the partition member and toward the melt, the partition member being within the last 25% of the length of the dopant conduit.

~~2. The ingot puller apparatus as set forth in claim 1 wherein the partition member is porous to allow sublimed dopant to pass through the partition member and toward the melt.~~

~~3~~2. The ingot puller apparatus as set forth in claim ~~2~~1 wherein the partition member has a nominal maximum pore size of less than ~~about~~ 1 mm.

~~4~~3. The ingot puller apparatus as set forth in claim ~~2~~1 wherein the partition member has a nominal maximum pore size of less than ~~about~~ 500 µm.

~~5~~4. The ingot puller apparatus as set forth in claim ~~2~~1 wherein the partition member has a nominal maximum pore size from ~~about~~ 1 µm to ~~about~~ 1 mm.

~~6~~5. The ingot puller apparatus as set forth in claim ~~2~~1 wherein the partition member has a nominal maximum pore size from ~~about~~ 10 µm to ~~about~~ 750 µm.

~~7~~6. The ingot puller apparatus as set forth in claim 1 wherein the dopant conduit is cylindrical and the partition member is a disk.

~~8~~7. The ingot puller apparatus as set forth in claim 1 wherein the dopant conduit is oval, triangular, square, or rectangle in cross-section.

~~9~~8. The ingot puller apparatus as set forth in claim 1 wherein the dopant conduit has a longitudinal axis, the crucible having a horizontal plane that extends across a top of the crucible, the longitudinal axis of the dopant conduit and the horizontal plane forming an angle of between ~~about~~ 45 degrees and ~~about~~ 90 degrees.

~~10~~9. The ingot puller apparatus as set forth in claim 1 wherein the dopant conduit has a longitudinal axis, the crucible having a horizontal plane that extends across a top of the crucible, the longitudinal axis of the dopant

conduit and the horizontal plane forming an angle of between ~~about~~ 45 degrees and ~~about~~ 75 degrees.

~~11~~10. The ingot puller apparatus as set forth in claim ~~9~~8 wherein the partition member has a supporting surface having an uppermost point and a lowermost point relative to the longitudinal axis that define a supporting surface plane that extends through the uppermost and lowermost points, the longitudinal axis of the dopant conduit and the supporting surface plane forming an acute angle between ~~about~~ 45 degrees to ~~about~~ 90 degrees.

~~12~~11. The ingot puller apparatus as set forth in claim ~~9~~8 wherein the partition member has a supporting surface having an uppermost point and a lowermost point relative to the longitudinal axis that define a supporting surface plane that extends through the uppermost and lowermost points, the longitudinal axis of the dopant conduit and the supporting surface plane forming an acute angle between ~~about~~ 45 degrees to ~~about~~ 75 degrees.

~~13~~12. The ingot puller apparatus as set forth in claim ~~11~~10 wherein the supporting surface is parallel to the horizontal plane that extends across the top of the crucible.

~~14~~13. The ingot puller apparatus as set forth in claim ~~11~~10 wherein the supporting surface is parallel to the outlet of the dopant conduit.

~~15~~14. The ingot puller apparatus as set forth in claim 1 wherein the dopant conduit is in fluid communication with an inert gas source to introduce inert gas into the dopant conduit to mix with sublimed dopant to

form a doped inert gas, the doped inert gas being discharged through the outlet of the dopant conduit.

~~16~~15. The ingot puller apparatus as set forth in claim 1 in combination with solid dopant supported by the partition member, the solid dopant being arsenic.

~~17~~16. The ingot puller apparatus as set forth in claim 1 in combination with solid dopant supported by the partition member, the solid dopant being phosphorous.

~~18~~17. The ingot puller apparatus as set forth in claim 1 wherein ingot puller apparatus comprises a heating element for heating the crucible, the ingot puller apparatus being free of a separate heating element for heating the solid dopant.

~~19~~18. The ingot puller apparatus as set forth in claim 1 wherein the partition member is within the last 10% of the length of the dopant conduit.

~~20~~19. The ingot puller apparatus as set forth in claim 1 wherein the partition member is within the last 5% of the length of the dopant conduit.

~~21~~20. A method for preparing a doped ingot comprising:

preparing a melt of silicon in a crucible;

feeding solid dopant into an inlet of a dopant conduit, the dopant conduit extending into a growth chamber in which an ingot is pulled from the melt, the solid dopant passing through a conduit chamber defined by the dopant conduit and onto a partition member disposed within the dopant conduit that extends across a width of the conduit

chamber, the partition member being within the last 25% of a length of the dopant conduit;

heating solid dopant supported by the partition member with radiant heat from the melt to sublime the solid dopant;

introducing an inert gas into the dopant conduit, the inert gas mixing with sublimed dopant, the inert gas having sublimed dopant mixed therein passing through the partition member and being discharged through an outlet of the dopant conduit, a pressure of the inert gas being reduced upon passing through the partition member;

contacting inert gas having sublimed dopant mixed therein with the melt to absorb dopant from the inert gas into the melt; and

pulling a silicon ingot from the melt of silicon.

~~22~~21. The method as set forth in claim ~~21~~20 wherein the dopant is phosphorous.

~~23~~22. The method as set forth in claim ~~21~~20 ~~or claim 22~~ wherein the partition member is porous and has a nominal maximum pore size of less than ~~about~~ 1 mm.

~~24~~23. The method as set forth in claim ~~21~~20 wherein the partition member has a nominal maximum pore size of less than ~~about~~ 1 mm.

~~25~~24. The method as set forth in claim ~~21~~20 wherein the partition member has a nominal maximum pore size of less than ~~about~~ 500 µm.

~~26~~25. The method as set forth in claim ~~21~~20 wherein the partition member has a nominal maximum pore size from ~~about~~ 1 µm to ~~about~~ 1 mm.

~~27~~26. The method as set forth in claim ~~21~~20 wherein the partition member is parallel to a surface of the melt.

~~28~~27. The method as set forth in claim ~~21~~20 wherein the partition member is made of quartz.

~~29~~28. The method as set forth in claim ~~21~~20 wherein the pressure is reduced by at least ~~about~~ 5 mbar across the partition member.

~~30~~29. A method for preparing a doped ingot in an ingot puller apparatus comprising a crucible for holding a melt of silicon, a growth chamber for pulling a silicon ingot from the melt, and a dopant conduit for introducing dopant into the melt, the dopant conduit comprising one or more sidewalls, the one or more sidewalls forming a conduit chamber through which dopant passes, the conduit chamber having a width, the dopant conduit further comprising an inlet through which solid dopant is introduced into the dopant conduit, an outlet through which a gaseous dopant is discharged through the dopant conduit, and a partition member disposed between the inlet and the outlet and supporting solid dopant introduced through the inlet, the partition member extending across the width of the conduit chamber, the method comprising:

forming a melt of silicon in the crucible;

loading solid dopant onto the partition member, the partition member being positioned between ~~about~~ 1 mm

and ~~about~~ 15 mm from a surface of the melt to heat the solid dopant by radiant heat from the melt to cause the solid dopant to sublime;

introducing an inert gas into the conduit chamber, the inert gas mixing with sublimed dopant to form a doped inert gas;

passing the doped inert gas through the partition member to cause dopant to contact and enter the melt; and

pulling a doped ingot from the melt of silicon.

~~31~~30. The method as set forth in claim ~~30~~29 wherein the dopant conduit is cylindrical and the partition member is a disk.

~~32~~31. The method as set forth in claim ~~30~~29 wherein the dopant conduit is oval, triangular, square, or rectangle in cross-section.

~~33~~32. The method as set forth in claim ~~30~~29 wherein the dopant conduit has a longitudinal axis, the crucible having a horizontal plane that extends across a top of the crucible, the longitudinal axis of the dopant conduit and the horizontal plane forming an angle of between ~~about~~ 45 degrees and ~~about~~ 75 degrees.

~~34~~33. The method as set forth in claim ~~30~~29 wherein the dopant conduit has a longitudinal axis, the partition member having a supporting surface having an uppermost point and a lowermost point relative to the longitudinal axis that define a supporting surface plane that extends through the uppermost and lowermost points, the longitudinal axis of the dopant conduit and the

supporting surface plane forming an acute angle between ~~about~~ 45 degrees to ~~about~~ 90 degrees.

~~35~~34. The method as set forth in claim ~~30~~29 wherein the supporting surface is parallel to a surface of the melt.

~~36~~35. The method as set forth in claim ~~21~~20 wherein the melt is heated by a heating element, the solid dopant not being heated by a heating element separate from the heating element used to heat the melt.

~~37~~36. The method as set forth in claim ~~21~~20 wherein the partition member is within the last 10% of the length of the dopant conduit.

~~38~~37. The method as set forth in claim ~~21~~20 wherein the partition member is within the last 5% of the length of the dopant conduit.

~~39~~38. The method as set forth in claim ~~30~~29 wherein the melt is heated by a heating element, the solid dopant not being heated by a heating element separate from the heating element used to heat the melt.

~~40~~39. The method as set forth in claim ~~30~~29 wherein the partition member is within the last 5% of a length of the dopant conduit.