CLAIMS:

1. An additive feed system for feeding at least two different additives to silicon disposed within a crucible, the additive feed system comprising:

a first canister for holding a first additive;

a second canister for holding a second additive;

a vessel for collecting first additive discharged from the first canister and second additive discharged from the second canister;

an additive sensor for sensing an amount of first additive or second additive in the vessel; and

an additive feed tube for transporting first additive or second additive from the vessel to the crucible.

2. The additive feed system as set forth in claim 1 comprising an actuator for releasing first additive or second additive from the vessel.

3. The additive feed system as set forth in claim 2 wherein the actuator selectively opens and closes the vessel to release first additive or second additive from the vessel.

4. The additive feed system as set forth in claim 2 further comprising a control unit, the control unit being communicatively coupled to the actuator, the control unit activating the actuator to discharge additive from the vessel into the additive feed tube upon the sensor sensing that the amount of additive in the vessel equals or exceeds a target additive amount.

5. The additive feed system as set forth in claim 4 wherein the control unit selectively controls addition of first additive to the vessel or second additive to the vessel.

6. The additive feed system as set forth in claim 4 comprising:

a first tray disposed below the first canister for moving first additive from the first canister to the vessel;

a first vibrator for vibrating the first tray to cause first additive to move along the first tray toward the vessel, the control unit being communicatively coupled to the first vibrator;

a second tray disposed below the second canister for moving second additive from the second canister to the vessel; and

a second vibrator for vibrating the second tray to cause second additive to move along the second tray toward the vessel, the control unit being communicatively coupled to the first vibrator.

7. The additive feed system as set forth in claim 1 comprising:

a first tray disposed below the first canister for moving first additive from the first canister to the vessel;

a first vibrator for vibrating the first tray to cause first additive to move along the first tray toward the vessel;

a second tray disposed below the second canister for moving second additive from the second canister to the vessel; and

a second vibrator for vibrating the second tray to cause second additive to move along the second tray toward the vessel.

8. The additive feed system as set forth in claim 1 wherein the additive sensor senses the level, volume or mass of the additive.

9. The additive feed system as set forth in claim 1 wherein the additive sensor is a load cell.

10. An ingot puller apparatus for preparing a silicon ingot, the ingot puller apparatus comprising:

a crucible for holding a silicon melt;

a growth chamber for pulling a silicon ingot from the melt, the crucible being disposed within the crucible;

an additive feed system for feeding at least two different additives to silicon disposed within the crucible, the additive feed system comprising:

a first canister for holding a first additive;

a second canister for holding a second additive;

a vessel for collecting first additive discharged from the first canister and second additive discharged from the second canister; and

an additive feed tube for transporting first additive or second additive from the vessel to the crucible.

11. The ingot puller apparatus as set forth in claim 10 wherein the additive feed system comprises an additive sensor for sensing an amount of first additive or second additive in the vessel.

12. The ingot puller apparatus as set forth in claim 11 wherein the additive sensor is a load cell.

13. The ingot puller apparatus as set forth in claim 10 wherein the additive feed system comprises an actuator for releasing first additive or second additive from the vessel.

14. The ingot puller apparatus as set forth in claim 10 comprising:

a first tray disposed below the first canister for moving first additive from the first canister to the vessel;

a first vibrator for vibrating the first tray to cause first additive to move along the first tray toward the vessel;

a second tray disposed below the second canister for moving second additive from the second canister to the vessel; and

a second vibrator for vibrating the second tray to cause second additive to move along the second tray toward the vessel.

15. A method for forming a single crystal silicon ingot comprising:

adding solid-phase polycrystalline silicon to a crucible having a sidewall and a bottom;

heating the polycrystalline silicon to form a silicon melt having a surface;

contacting the silicon melt with a seed crystal;

withdrawing the seed crystal from the silicon melt to form a silicon ingot;

adding a first additive to a vessel;

weighing an amount of first additive in the vessel;

adding the first additive to the melt when the amount of first additive in the vessel equals or exceeds a target first additive amount;

adding a second additive to the vessel;

weighing an amount of second additive in the vessel; and

adding the second additive to the melt when the amount of second additive in the vessel equals or exceeds a target second additive amount.

16. The method as set forth in claim 15 wherein the first additive is added before the silicon melt is contacted with the seed crystal.

17. The method as set forth in claim 16 wherein the second additive is added before the silicon melt is contacted with the seed crystal.

18. The method as set forth in claim 15 wherein the ingot is grown in a batch Czochralski process and polycrystalline silicon is not added to the melt during ingot growth.

19. The method as set forth in claim 15 wherein the ingot is grown in a continuous Czochralski process in which polycrystalline silicon is added to the melt during ingot growth.