CLAIMS:

1. A method of forming a phase change material comprising germanium and tellurium, comprising:

depositing a germanium-comprising material over a substrate, the germanium-comprising material comprising elemental-form germanium; and

flowing a gaseous tellurium-comprising precursor to the germanium-comprising material and removing tellurium from the gaseous precursor to react with the elemental-form germanium in the germanium-comprising material to form a germanium and tellurium-comprising compound of a phase change material over the substrate.

2. The method of claim 1 being self-limiting to formation of the germanium and tellurium-comprising compound, and comprising continuing the flowing of the gaseous precursor to the germanium-comprising material at least until no more of the compound is formed whereby the forming of the germanium and tellurium-comprising compound self-limits in thickness from said flowing.

3. The method of claim 2 comprising continuing said flowing for at least 10 seconds after no more of said compound is formed.

4. The method of claim 3 comprising removing tellurium from the gaseous precursor at least after no more of said compound is formed.

5. The method of claim 1 comprising, after the flowing:

depositing more germanium-comprising material which comprises elemental-form germanium; and

after said depositing of more, flowing a gaseous tellurium-comprising precursor to the germanium-comprising material which removes tellurium to react with the elemental-form germanium to form a germanium and tellurium-comprising compound.

6. The method of claim 1 comprising repeating said depositing and said flowing at least once.

7. The method of claim 1 comprising repeating said depositing and said flowing more than once.

8. The method of claim 7 wherein each depositing of germanium-comprising material is to a thickness of from 1 Angstrom to 20 Angstroms.

9. The method of claim 1 wherein said depositing and said flowing comprise a cycle, thickness of the phase change material formed from the flowing being at least 50% greater than thickness of the deposited germanium-comprising material to which the gaseous tellurium comprising material is flowed in the cycle.

10. The method of claim 9 wherein thickness of the phase change material formed from the flowing is at least 100% greater than thickness of the deposited germanium-comprising material to which the gaseous tellurium comprising material is flowed in the cycle.

11. The method of claim 1 wherein the tellurium-comprising precursor is organic.

12. The method of claim 11 wherein the tellurium-comprising precursor is void of NR_2.

13. The method of claim 1 wherein the tellurium-comprising precursor is inorganic.

14. The method of claim 1 wherein the tellurium-comprising precursor is void of nitrogen.

15. The method of claim 1 wherein the germanium-comprising material comprises antimony, the germanium and tellurium-comprising compound comprising antimony.

16. A method of forming a phase change material comprising germanium and tellurium, comprising:

forming an opening into material of a substrate;

lining the opening with a germanium-comprising material, the germanium-comprising material being received over the material outside of the opening, the germanium-comprising material comprising elemental-form germanium;

flowing a gaseous tellurium-comprising precursor to the germanium-comprising material within the opening and outside of the opening and removing tellurium from the gaseous precursor to react with the elemental-form germanium in the germanium-comprising material to form a germanium and tellurium-comprising compound of a phase change material; and

rate of formation of the germanium and tellurium-comprising compound being less proximate a base of the opening as compared to outside of the opening, and continuing the flowing of the gaseous precursor beyond a point where no more of the compound is formed outside of the opening but continues to be formed within the opening whereby the forming of the germanium and tellurium-comprising compound self-limits in thickness from said flowing.

17. The method of claim 16 comprising continuing said flowing for at least 10 seconds after no more of said compound is formed within the opening.

18. The method of claim 16 comprising removing tellurium from the gaseous precursor outside of the opening at least after no more of said compound is formed outside of the opening.

19. A method of forming phase change memory circuitry, comprising:

forming inner electrode material over a substrate;

forming a tellurium-comprising phase change material over the inner electrode material, the forming of the phase change material comprising:

depositing a germanium-comprising material over the inner electrode material, the germanium-comprising material comprising elemental-form germanium; and

flowing a gaseous tellurium-comprising precursor to the germanium-comprising material and removing tellurium from the gaseous precursor to react with the elemental-form germanium in the germanium-comprising material to form a germanium and tellurium-comprising compound; and

forming outer electrode material over the tellurium-comprising phase change material.

20. A method of forming phase change memory circuitry, comprising:

forming an opening into material of a substrate and providing an inner electrode material proximate a base of the opening;

lining the opening with a germanium-comprising material, the germanium-comprising material being received over the material outside of the opening, the germanium-comprising material comprising elemental-form germanium;

flowing a gaseous tellurium-comprising precursor to the germanium-comprising material within the opening and outside of the opening and removing tellurium from the gaseous precursor to react with the elemental-form germanium in the germanium-comprising material to form a germanium and tellurium-comprising compound of a tellurium-comprising phase change material;

rate of formation of the germanium and tellurium-comprising compound being less proximate the base of the opening as compared to outside of the opening, and continuing the flowing of the gaseous precursor beyond a point where no more of the compound is formed outside of the opening but continues to be formed within the opening whereby the forming of the germanium and tellurium-comprising compound self-limits in thickness from said flowing; and

forming outer electrode material over the tellurium-comprising phase change material.

21. A method of depositing a tellurium-comprising phase change material onto a substrate, comprising:

forming a monolayer comprising $Te(OR)_t$ onto a substrate from gaseous $Te(OR)_4$, where R is alkyl and t is less than 4; and

providing a reducing agent to the monolayer to remove $(OR)_t$ ligand from the Te and forming there-from a tellurium–comprising phase change material on the substrate, the phase change material having no greater than 10 atomic percent oxygen and comprising another metal in addition to tellurium.

22. The method of claim 21 wherein the providing produces the phase change material to have no greater than 5 atomic percent oxygen.

23. The method of claim 21 wherein the providing produces the phase change material to have no greater than 1 atomic percent oxygen.

24. The method of claim 21 wherein the providing produces the phase change material to have no detectable oxygen therein.

25. The method of claim 21 wherein the reducing agent comprises at least one of NH_3, H_2, CH_2O, and CH_2O_2.

26. The method of claim 25 wherein the reducing agent comprises NH_3.

27. The method of claim 21 wherein the another metal comprises Ge.

28. The method of claim 21 wherein the another metal comprises Ge and Sb.

29. The method of claim 21 comprising forming the monolayer to also comprise $Te(OR)_wQ_z$ from gaseous $Te(OR)_xQ_y$, where Q is a halogen, x is less than 4, and y is 4-x; and where at least one of w is less than x, or z is less than y.

30. A method of forming phase change memory circuitry, comprising:

forming inner electrode material over a substrate;

forming phase change material over the inner electrode material, the forming of phase change material comprising:

forming a monolayer comprising $Te(OR)_t$ onto a substrate from gaseous $Te(OR)_4$, where R is alkyl and t is less than 4; and

providing a reducing agent to the monolayer to remove $(OR)_t$ ligand from the Te and forming there-from a tellurium–comprising phase change material on the substrate, the tellurium-comprising phase change material having no greater than 10 atomic percent oxygen and comprising another metal in addition to tellurium; and

forming outer electrode material over the tellurium-comprising phase change material.

31. The method of claim 30 comprising forming the monolayer to also comprise $Te(OR)_wQ_z$ from gaseous $Te(OR)_xQ_y$, where Q is a halogen, x is less than 4, and y is 4-x; and where at least one of w is less than x, or z is less than y.

32. A method of depositing a tellurium-comprising phase change material onto a substrate, comprising:

forming a monolayer comprising $Te(OR)_wQ_z$ onto a substrate from gaseous $Te(OR)_xQ_y$, where R is alkyl, Q is a halogen, x is less than 4, and y is 4-x; and where at least one of w is less than x, or z is less than y; and

providing a reducing agent to the monolayer to remove $(OR)_w$ ligand and Q from the Te and forming there-from a tellurium–comprising phase change material on the substrate, the phase change material having no greater than 10 atomic percent oxygen and comprising another metal in addition to tellurium.

33. The method of claim 32 wherein both of w is less than x and z is less than y.

34. The method of claim 32 wherein only one of w is less than x and z is less than y.

35. The method of claim 34 wherein w is less than x.

36. The method of claim 34 wherein z is less than y.

37. A method of forming phase change memory circuitry, comprising:

forming inner electrode material over a substrate;

forming phase change material over the inner electrode material, the forming of phase change material comprising:

forming a monolayer comprising $Te(OR)_wQ_z$ onto a substrate from gaseous $Te(OR)_xQ_y$, where R is alkyl, Q is a halogen, x is less than 4, and y is 4-x; and where at least one of w is less than x, or z is less than y; and

providing a reducing agent to the monolayer to remove $(OR)_w$ ligand and Q from the Te and forming there-from a tellurium–comprising phase change material on the substrate, the tellurium-comprising phase change material having no greater than 10 atomic percent oxygen and comprising another metal in addition to tellurium; and

forming outer electrode material over the tellurium-comprising phase change material.

CLAIMS

1. A method of forming a phase change material comprising germanium and tellurium, comprising:

depositing a germanium-comprising material over a substrate utilizing at least one germanium precursor selected from GeH4, tetrakis dialkylamido germanium and *bis*-ditertbutyl germanium amidinate, and utilizing a reducing precursor to promote the elemental-form germanium to form the germanium-comprising layer to consist of elemental germanium; and

flowing a gaseous tellurium-comprising precursor selected from the group consisting of TeH_2, ditertbutyl telluride, tellurium IV ethoxide, tetrakis dimethylamido tellurium and combinations thereof to the germanium-comprising material and removing tellurium from the gaseous precursor to react with the elemental-form germanium in the germanium-comprising material to form a germanium and tellurium-comprising compound of the phase change material over the substrate.

2. The method of claim 1 being self-limiting to formation of the germanium and tellurium-comprising compound, and comprising continuing the flowing of the gaseous precursor to the germanium-comprising material at least until no more of the compound is formed whereby the forming of the germanium and tellurium-comprising compound self-limits in thickness from said flowing.

3. The method of claim 2 comprising continuing said flowing for at least 10 seconds after no more of said compound is formed.

4. The method of claim 3 comprising removing tellurium from the gaseous precursor at least after no more of said compound is formed.

5. The method of claim 1 comprising, after the flowing: depositing more of the germanium-comprising material which comprises the elemental-form germanium; and

after said depositing of more of the germanium-comprising material, flowing the gaseous tellurium-comprising precursor to the germanium-comprising material which removes tellurium to react with the elemental-form germanium to form the germanium and tellurium-comprising compound.

6. The method of claim 1 comprising repeating said depositing and said flowing at least once.

7. The method of claim 1 comprising repeating said depositing and said flowing more than once.

8. The method of claim 7 wherein each depositing of germanium-comprising material forms a layer that has a thickness of between 1 Angstrom and 20 Angstroms.

9. The method of claim 1 wherein said depositing and said flowing comprise a cycle, wherein a thickness of the phase change material formed

from the flowing is at least 50% greater than a thickness of the deposited germanium-comprising material to which the gaseous tellurium comprising material is flowed in the cycle.

10. The method of claim 9 wherein the thickness of the phase change material formed from the flowing is at least 100% greater than the thickness of the deposited germanium-comprising material to which the gaseous tellurium comprising material is flowed in the cycle.

11. The method of claim 1 wherein the tellurium-comprising precursor is organic.

12. The method of claim 11 wherein the tellurium-comprising precursor is void of NR_2, where R is organic.

13. The method of claim 1 wherein the tellurium-comprising precursor is inorganic.

14. The method of claim 1 wherein the tellurium-comprising precursor is void of nitrogen.

15. The method of claim 1 wherein the germanium-comprising material comprises antimony, and the germanium and tellurium-comprising compound comprises antimony.

16. A method of forming a phase change material comprising germanium and tellurium, comprising:

forming an opening into material of a substrate;

lining the opening with a germanium-comprising material utilizing at least one germanium precursor selected from GeH4, tetrakis dialkylamido germanium and *bis*-ditertbutyl germanium amidinate, the germanium-comprising material being received over the material outside of the opening, the germanium-comprising material comprising elemental-form germanium, and utilizing a reducing precursor to promote the elemental-form germanium that consists of elemental germanium;

flowing a gaseous tellurium-comprising precursor selected from the group consisting of TeH_2, ditertbutyl telluride, tellurium IV ethoxide, tetrakis dimethylamido tellurium and combinations thereof to the germanium-comprising material within the opening and outside of the opening and removing tellurium from the gaseous precursor to react with the elemental-form germanium in the germanium-comprising material to form a germanium and tellurium-comprising compound of the phase change material; wherein the flowing of the gaseous tellurium-comprising precursor is continued beyond a point where no more of the germanium and tellurium-comprising compound is formed outside of the opening but continues to be formed within the opening whereby the forming of the germanium and tellurium-comprising compound self-limits in thickness from said flowing.

17. The method of claim 16 comprising continuing said flowing for at least 10 seconds after no more of said compound is formed within the opening.

18. The method of claim 16 comprising removing tellurium from the gaseous precursor outside of the opening at least after no more of said compound is formed outside of the opening.