What is claimed is:

1. A method of forming a phase change memory structure, the method comprising:

forming an insulator material on a first conductive element and on a dielectric material of a phase change memory cell;

forming a heater self-aligned with the first conductive element;

forming a phase change material on the heater and at least a portion of the insulator material formed on the dielectric material; and

forming a second conductive element of the phase change memory cell on the phase change material.

2. The method of claim 1, including forming the heater by modifying a portion of the insulator material.

3. The method of claim 2, including forming the phase change material on the heater and on an unmodified portion of the insulator material.

4. The method of claim 2, wherein modifying the portion of the insulator material includes heating the portion of the insulator material.

5. The method of any one of claims 1-4, wherein heating the portion of the insulator material includes at least one of:

a rapid thermal annealing (RTA) process;

a laser annealing process; and

a microwave heating process.

6. The method of claim 2, wherein modifying the portion of the insulator material includes creating a reaction between the insulator material and a material of the first conductive element to form the heater.

7. The method of claim 6, wherein the insulator material is aluminum nitride (AlN), the material of the first conductive element is at least one of

titanium (Ti) and titanium nitride (TiN), and wherein the reaction forms a titanium aluminum nitride (TiAlN) heater.

8. The method of claim 6, wherein the insulator material is silicon nitride (SiN), the material of the first conductive element is at least one of titanium nitride (TiN) and tantalum nitride (TaN), and wherein the reaction forms at least one of a titanium silicon nitride (TiSiN) heater and a tantalum silicon nitride (TaSiN) heater.

9. The method of any one of claims 1-4, including forming the heater self-aligned with the first conductive element via a masking and etching process.

10. The method of any one of claims 1-4, wherein forming the first conductive element includes forming a bottom electrode and forming the second conductive element includes forming a top electrode.

11. A method of forming a phase change memory structure, the method comprising:

forming an insulative adhesion material on a first electrode of a phase change memory cell;

forming an interfacial heater self-aligned with the first electrode by heating at least a portion of the insulative adhesion material, the interfacial heater being a material different than the insulative adhesion material;

forming a phase change material on the interfacial heater; and

forming a second electrode on the phase change material.

12. The method of claim 11, including:

forming the first electrode such that a side surface of the first electrode is in contact with a dielectric material; and

forming the insulative adhesion material on at least a portion of an upper surface of the dielectric material.

13. The method of claim 12, including forming the phase change material on an upper surface of the interfacial heater and on an upper surface of at least a portion of the insulative adhesion material.

14. The method of claim 11, including:

forming the first electrode by depositing an electrode material in a via formed in a dielectric material; and

performing a planarization process on the first electrode prior to forming the insulative adhesion material on the first electrode.

15. The method of any one of claims 11-14, wherein heating the at least a portion of the insulative adhesion material includes performing a thermal annealing process on the phase change memory structure.

16. The method of any one of claims 11-14, wherein heating the at least a portion of the insulative adhesion material includes performing a microwave heating process on the at least a portion of the insulative adhesion material.

17. The method of any one of claims 11-14, wherein heating the at least a portion of the insulative adhesion material includes performing a laser annealing process on the at least a portion of the insulative adhesion material.

18. The method of any one of claims 11-14, including reducing oxidation of the first electrode by performing an in situ plasma treatment process prior to forming the insulative adhesion material on the first electrode and prior to heating the at least a portion of the insulative adhesion material.

19. A phase change memory structure, comprising:

a bottom electrode having a side surface in contact with a dielectric material;

a phase change material between the bottom electrode and a top electrode;

an insulator material having a first portion providing an adhesive interface for at least a portion of the phase change material; and

an interfacial heater self-aligned with the bottom electrode and positioned between the bottom electrode and the phase change material; wherein the interfacial heater is a modified portion of the insulator material and is a material different from the insulator material.

20. The memory structure of claim 19, wherein the first portion of the insulator material is formed on a planarized surface of the dielectric material and the bottom electrode.

21. The memory structure of claim 19, wherein the bottom electrode is formed in a via formed in the dielectric material, and wherein the adhesive interface provided by the first portion of the insulator material includes increased adhesion as compared to adhesion between the phase change material and the dielectric material.

22. The memory structure of claim 19, wherein the self-aligned interfacial heater is formed by a reaction between the insulator material and a material of the bottom electrode.

23. The memory structure of claim 19, wherein the insulator material has a thickness of less than about 10 nm.

24. The memory structure of any one of claims 19-23, wherein the bottom electrode is coupled to a metal contact, and wherein the metal contact is coupled to at least one of a source and a drain region of an access transistor corresponding to the phase change memory structure.

25. The memory structure of any one of claims 19-23, wherein the insulator material is at least one of aluminum nitride (AlN) and silicon nitride (SiN).

26. The memory structure of claim 25, wherein the interfacial heater includes a material from the group including:

titanium aluminum nitride (TiAlN)

titanium silicon nitride (TiSiN); and

tantalum silicon nitride (TaSiN).

27. A phase change memory cell, comprising:

an access device;

a first electrode coupled to the access device via a conductive contact;

an interfacial heater formed on, and self-aligned with, the first electrode;

a phase change material formed on the self-aligned interfacial heater and on at least a portion of an insulator material formed on a dielectric material having a side surface in contact with the first electrode; and

a second electrode formed on the phase change material;

wherein the self-aligned interfacial heater is a portion of the insulator material modified via a heating process such that the self-aligned interfacial heater is a material different from the insulator material.

28. The device of claim 27, wherein the interfacial heater is configured to generate heat to assist with programming of the memory cell.

29. The device of any one of claims 27-28, wherein the interfacial heater has a thermal conductivity conducive to reducing heat loss to the first electrode.

30. A method of operating a phase change memory cell, the method comprising:

programming the memory cell by providing a voltage difference between a top and bottom electrode of the phase change memory cell; and

providing localized heating to an active region of a phase change material of the memory cell via an interfacial heater formed on, and self-aligned with, the bottom electrode;

wherein the interfacial heater generates heat responsive to the voltage difference which assists with switching of a state of the active region to program the memory cell.

31. The method of claim 30, wherein the interfacial heater is a modified portion of a dielectric material located between the phase change material and the bottom electrode.

What is claimed is:

1. A method of forming a phase change memory structure, the method comprising:

forming an insulator material on a first conductive element and on a dielectric material of a phase change memory cell;

forming a heater self-aligned with the first conductive element;

forming a phase change material on the heater and at least a portion of the insulator material formed on the dielectric material; and

forming a second conductive element of the phase change memory cell on the phase change material;

wherein forming the heater includes modifying a portion of the insulator material by heating the portion of the insulator material.

2. The method of claim 1, including forming the phase change material on the heater and on an unmodified portion of the insulator material.

3. The method of claim 1, wherein heating the portion of the insulator material includes at least one of:

a rapid thermal annealing (RTA) process;

a laser annealing process; and

a microwave heating process.

4. The method of claim 1, including forming the heater self-aligned with the first conductive element via a masking and etching process.

5. The method of claim 1, wherein forming the first conductive element includes forming a bottom electrode and forming the second conductive element includes forming a top electrode.

6. A method of forming a phase change memory structure, the method comprising:

forming an insulative adhesion material on a first electrode of a phase change memory cell;

forming an interfacial heater self-aligned with the first electrode by heating at least a portion of the insulative adhesion material, the interfacial heater being a material different than the insulative adhesion material;

forming a phase change material on the interfacial heater; and

forming a second electrode on the phase change material.

7. The method of claim 6, including:

forming the first electrode such that a side surface of the first electrode is in contact with a dielectric material; and

forming the insulative adhesion material on at least a portion of an upper surface of the dielectric material.

8. The method of claim 7, including forming the phase change material on an upper surface of the interfacial heater and on an upper surface of at least a portion of the insulative adhesion material.

9. The method of claim 6, including:

forming the first electrode by depositing an electrode material in a via formed in a dielectric material; and

performing a planarization process on the first electrode prior to forming the insulative adhesion material on the first electrode.

10. The method of claim 6, wherein heating the at least a portion of the insulative adhesion material includes performing a thermal annealing process on the phase change memory structure.

11. The method of claim 6, wherein heating the at least a portion of the insulative adhesion material includes performing a microwave heating process on the at least a portion of the insulative adhesion material.

12. The method of claim 6, wherein heating the at least a portion of the insulative adhesion material includes performing a laser annealing process on the at least a portion of the insulative adhesion material.

13. The method of claim 6, including reducing oxidation of the first electrode by performing an in situ plasma treatment process prior to forming the insulative adhesion material on the first electrode and prior to heating the at least a portion of the insulative adhesion material.

14. A phase change memory structure, comprising:

a bottom electrode having a side surface in contact with a dielectric material;

a phase change material between the bottom electrode and a top electrode;

an insulator material having a first portion providing an adhesive interface for at least a portion of the phase change material, wherein the insulator material has a thickness of less than about 10 nm; and

an interfacial heater self-aligned with the bottom electrode and positioned between the bottom electrode and the phase change material; wherein the interfacial heater is a modified portion of the insulator material and is a material different from the insulator material.

15. The memory structure of claim 14, wherein the first portion of the insulator material is formed on a planarized surface of the dielectric material and the bottom electrode.

16. The memory structure of claim 14, wherein the bottom electrode is formed in a via formed in the dielectric material, and wherein the adhesive interface provided by the first portion of the insulator material includes increased adhesion as compared to adhesion between the phase change material and the dielectric material.

17. The memory structure of claim 14, wherein the bottom electrode is coupled to a metal contact, and wherein the metal contact is coupled to at least one of a source and a drain region of an access transistor corresponding to the phase change memory structure.

18. The memory structure of claim 14, wherein the insulator material is at least one of aluminum nitride (AlN) and silicon nitride (SiN).

19. The memory structure of claim 18, wherein the interfacial heater includes a material from the group including:

titanium aluminum nitride (TiAlN)

titanium silicon nitride (TiSiN); and

tantalum silicon nitride (TaSiN).

20. A phase change memory cell, comprising:

an access device;

a first electrode coupled to the access device via a conductive contact;

an interfacial heater formed on, and self-aligned with, the first electrode;

a phase change material formed on the self-aligned interfacial heater and on at least a portion of an insulator material formed on a dielectric material having a side surface in contact with the first electrode; and

a second electrode formed on the phase change material;

wherein the self-aligned interfacial heater is a portion of the insulator material modified via a heating process such that the self-aligned interfacial heater is a material different from the insulator material.

21. The device of claim 20, wherein the interfacial heater is configured to generate heat to assist with programming of the memory cell.

22. The device of claim 20, wherein the interfacial heater has a thermal conductivity conducive to reducing heat loss to the first electrode.

23. A method of operating a phase change memory cell, the method comprising:

programming the memory cell by providing a voltage difference between a top and bottom electrode of the phase change memory cell; and

providing localized heating to an active region of a phase change material of the memory cell via an interfacial heater formed on, and self-aligned with, the bottom electrode;

wherein the interfacial heater generates heat responsive to the voltage difference which assists with switching of a state of the active region to program the memory cell; and

wherein the interfacial heater is a modified portion of a dielectric material located between the phase change material and the bottom electrode, the modified portion of the dielectric material being modified by at least one of a heating process and a reaction between the dielectric material and a material of the bottom electrode.

24. A method of forming a phase change memory structure, the method comprising:

forming an insulator material on a first conductive element and on a dielectric material of a phase change memory cell;

forming a heater self-aligned with the first conductive element;

forming a phase change material on the heater and at least a portion of the insulator material formed on the dielectric material; and

forming a second conductive element of the phase change memory cell on the phase change material;

wherein forming the heater includes modifying a portion of the insulator material by creating a reaction between the insulator material and a material of the first conductive element;

wherein the insulator material comprises at least one of aluminium nitride and silicon nitride;

wherein the material of the first conductive element comprises at least one of titanium, titanium nitride, and tantalum nitride; and

wherein the reaction forms at least one of a titanium aluminum nitride heater, a titanium silicon nitride heater, and a tantalum silicon nitride heater.

25. A phase change memory structure, comprising:

a bottom electrode having a side surface in contact with a dielectric material;

a phase change material between the bottom electrode and a top electrode;

an insulator material having a first portion providing an adhesive interface for at least a portion of the phase change material; and

an interfacial heater self-aligned with the bottom electrode and positioned between the bottom electrode and the phase change material; wherein the interfacial heater is a modified portion of the insulator material and is a material different from the insulator material, and wherein the self-aligned interfacial heater is formed by a reaction between the insulator material and a material of the bottom electrode.