CLAIMS

1. A memory structure comprising:

a phase change element located above a heater; and

wherein the heater comprises a conductive element surrounding a dielectric element, characterized in that the dielectric element includes an air gap.

2. The structure of claim 1, wherein the conductive element comprises a first conductive liner and a second conductive liner.

3. The structure of claim 2, wherein the second conductive liner is about 0.05 to about 0.5 times a resistance of the first conductive liner.

4. The structure of any one of the preceding claims further comprising a bottom liner between the heater and the phase change element.

5. The structure of any one of the preceding claims, wherein a material of the dielectric element is selected from the group consisting of: SiN, SiO2, and SiCxOy.

6. The structure of any one of the claims 1 to 5, wherein the air gap comprises at least 0.1 % of the volume of a region containing the dielectric element.

7. The structure of any one of the claims 2 to 6, wherein a material of the first conductive liner is selected from the group consisting of: TaN and SiN.

8. The structure of any one of the claims 2 to 7, wherein a material of the second conductive liner is selected from the group consisting of: TiN, graphene, TaN, W, Cu, Ru, Au, and Pt.

9. The structure of any one of the claims 4 to 8, wherein a material of the bottom liner is TaN.

10. A method of forming a memory structure comprising:

conformally depositing a heater liner on a Mx+1 dielectric and an Mx contact;

forming a heater dielectric within the heater liner, wherein forming the heater dielectric comprises forming an air gap within the heater dielectric;

forming a bottom liner above the heater liner; and

forming a phase change material above the bottom liner.

11. The method of claim 10, wherein the heater liner comprises a first liner and a second liner.