

Claims

What is claimed is:

1. A memory device, comprising:
 - a memory cell;
 - a selector device for selecting the memory cell, wherein the selector device consists of:
 - a first electrode;
 - a second electrode; and
 - a switching layer sandwiched between the first electrode and the second electrode, the switching layer consisting of a plurality of metal rich layers and a plurality of chalcogenide rich layers;
 - wherein the metal rich layers and the chalcogenide rich layers are arranged alternately, the plurality of metal rich layers having the same material, and the plurality of chalcogenide rich layers having the same material;
 - wherein a number of the metal rich layers is same as a number of chalcogenide rich layers;
 - wherein each metal rich layer of the plurality of metal rich layers comprises at least one of a metal or a metal compound, and wherein metal content of each metal rich layer of the plurality of metal rich layers is greater than 50 at.%;
 - wherein each chalcogenide rich layer of the plurality of chalcogenide rich layers comprises a mixture comprising a chalcogenide and any one material selected from a group consisting of a dielectric material and a metal material, and wherein chalcogenide content of each chalcogenide rich layer of the plurality of chalcogenide rich layers is greater than 50 at.%; and
 - a third electrode;
 - wherein the memory cell is arranged on the second electrode, and the third electrode is arranged on the memory cell.

2. The memory device of claim 1, wherein each of the metal rich layers and each of the chalcogenide rich layers have a thickness in a range of 1nm – 20nm.
3. The memory device of claim 1, wherein the metal compound comprises at least one of silver telluride, silver selenide, silver sulfide, copper telluride, copper selenide, or copper sulfide.
4. The memory device of claim 1, wherein the metal comprised in the metal rich layers comprises at least one of silver, copper, platinum, zinc, gold, ruthenium, or lithium.
5. The memory device of claim 1, wherein the metal content of the metal rich layers is substantially equal to 100 at. %.
6. The memory device of claim 5, wherein the material of the metal rich layers is different from a material of the first electrode and a material of the second electrode.
7. The memory device of claim 1, wherein the chalcogenide is a metalloid chalcogenide selected from germanium telluride, antimony telluride, germanium antimony telluride, germanium selenide, germanium sulfide, germanium oxide, germanium antimony, or antimony sulfide.
8. The memory device of claim 1, wherein the chalcogenide is a metal chalcogenide selected from silver telluride, silver selenide, silver sulfide, copper telluride, copper selenide, or copper sulfide.