

## WHAT IS CLAIMED IS:

1. A chalcogenide material in an amorphous state comprising:  
germanium (Ge), arsenic (As), selenium (Se) and from 0.5 at% to 3 at% of at least one group 13 element, wherein a sum of a concentration of the germanium (Ge), a concentration of the arsenic (As) and a concentration of the selenium (Se) is from 97 at% to 99.5 at%.
2. The chalcogenide material of claim 1, wherein the chalcogenide material is  $\text{Ge}_a\text{As}_b\text{Se}_c\text{X}_{1-(a+b+c)}$ , wherein  $0.12 \leq a \leq 0.33$ ,  $0.12 \leq b \leq 0.36$ , and  $0.30 \leq c \leq 0.69$ .
3. The chalcogenide material of claim 1, wherein the at least one group 13 element includes boron (B), aluminum (Al), gallium (Ga), indium (In), thallium (Tl), or a combination thereof.
4. The chalcogenide material of claim 1, wherein a concentration of the at least one group 13 element is less than half of a sum of the concentration of the germanium (Ge) and the concentration of the arsenic (As).
5. A variable resistance memory device comprising:  
a first electrode;  
a second electrode; and  
a chalcogenide film in an amorphous state interposed between the first electrode and the second electrode,  
wherein the chalcogenide film includes a group 13 element, a group 14 element, a group 15 element, and a group 16 element,  
wherein a sum of a concentration of the group 14 element, a concentration of the group 15 element, and a concentration of the group 16 element is from 97 at% to 99.5 at%, and  
wherein a concentration of the group 13 element is from 0.5 at% to 3 at% of at least one group 13 element.

6. The variable resistance memory device of claim 5, wherein the chalcogenide film is an ovonic threshold switching material.

7. The variable resistance memory device of claim 5, wherein the chalcogenide film is a ternary chalcogenide switching material including the group 14 element, the group 15 element, and the group 16 element.

8. The variable resistance memory device of claim 7, wherein a concentration of the group 13 element is less than half of a sum of the concentration of the group 14 element and the concentration of the group 15 element.

9. The variable resistance memory device of claim 5, wherein the chalcogenide film is  $\text{Ge}_a\text{As}_b\text{Se}_c\text{X}_{1-(a+b+c)}$ , and  $0.12 \leq a \leq 0.33$ ,  $0.12 \leq b \leq 0.36$ , and  $0.30 \leq c \leq 0.69$ .

10. An electronic device comprising a semiconductor memory, wherein the semiconductor memory comprises:  
a column line;  
a row line intersecting the column line; and  
a memory cell positioned between the column line and the row line, wherein the memory cell comprises a chalcogenide film in an amorphous state including germanium (Ge), arsenic (As), selenium (Se), and from 0.5 at% to 3 at% of at least one group 13 element, and  
wherein a sum of a concentration of the germanium (Ge), a concentration of the arsenic (As) and a concentration of the selenium (Se) is from 97 at% to 99.5 at%.

11. The electronic device of claim 10, wherein the memory cell comprises a selection element including the chalcogenide film and a memory element coupled to the selection element.

12. The electronic device of claim 10, wherein the chalcogenide film is  $\text{Ge}_a\text{As}_b\text{Se}_c\text{X}_{1-(a+b+c)}$ , and  $0.12 \leq a \leq 0.33$ ,  $0.12 \leq b \leq 0.36$ , and  $0.30 \leq c \leq 0.69$ .

13. The electronic device of claim 10, wherein the at least one group 13 element includes boron (B), aluminum (Al), gallium (Ga), indium (In), thallium (Tl), or a combination thereof.

14. The electronic device of claim 10, wherein a concentration of the at least one group 13 element is less than half of a sum of the concentration of the germanium (Ge) and the concentration of the arsenic (As).