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(54) MULTILEVEL PHASE-CHANGE MEMORY ELEMENT AND OPERATING METHOD

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(30) Foreign Application Priority Data

Oct. 8, 2004 (TW) 93130600 A

(51) **Int. Cl.** *G11C 11/34* (2006.01)

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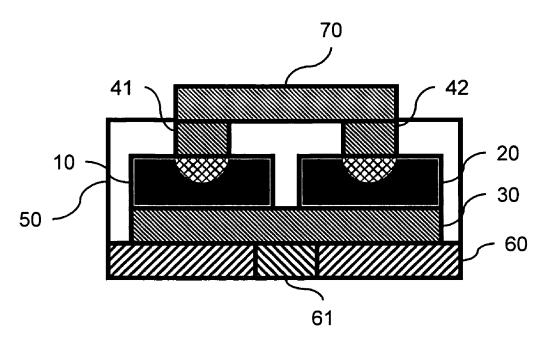
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(57) ABSTRACT

A multilevel phase change memory element and operating method and electrodes, which are configured in a parallel structure to form a memory cell. A voltage-drive mode is employed to control and drive the memory element such that multilevel memory states may be achieved by imposing different voltage levels. The provided multilevel phase-change memory element has more bits and higher capacity than that of a memory element with a single phase-change laver.

23 Claims, 13 Drawing Sheets





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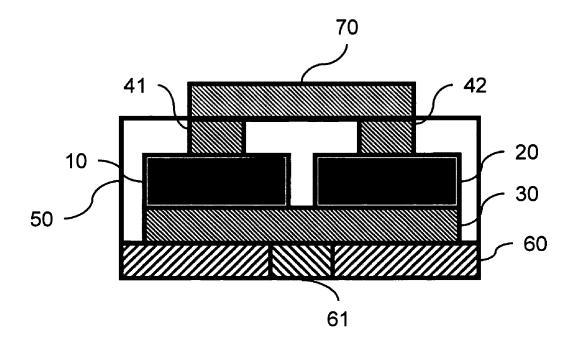


FIG. 1



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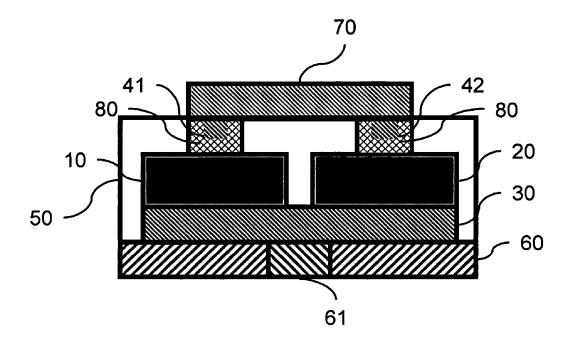
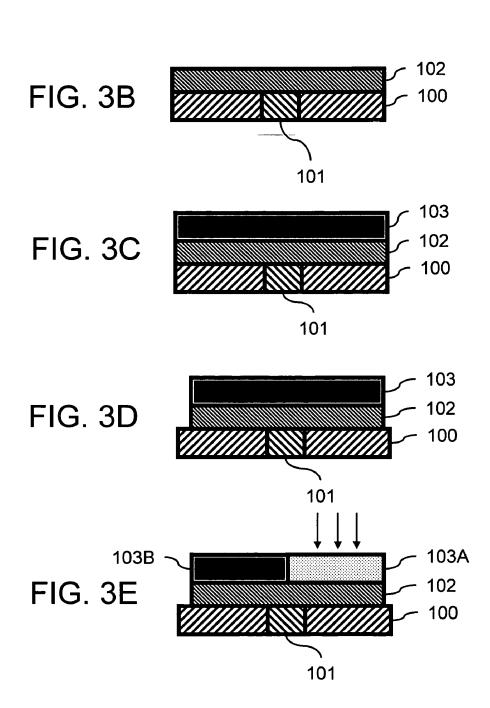
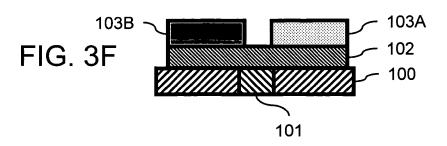


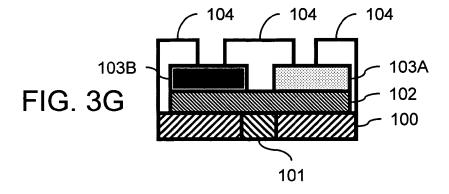
FIG. 2

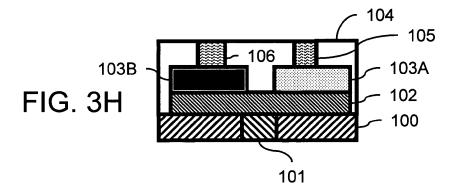


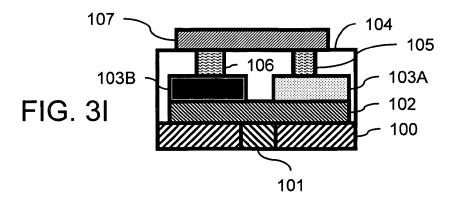












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