Vertical-Stacked-Array-Transistor (VSAT) for Nonvolatile Memory Devices

Tech ID: 22265 / UC Case 2010-381-0

SUMMARY

UCLA researchers in the Department of Electrical Engineering have created a novel Vertical-Stacked-Array-Transistor (VSAT) for ultra-high-density and cost-effective NAND flash memory devices and solid state drives.

BACKGROUND

The NAND flash memory has a simple cell structure allowing for higher density and more memory capacity. Further, it is ideal for mobile devices because flash memory is highly durable and able to withstand mechanic shock, high pressure, temperature, immersion in water, etc. Solid state drives, based on NAND flash memory, are lower in cost compare to DRAM and are able to retain data without a constant power supply. However, the cost per gigabyte compared to the conventional hard drive is still considerably higher. Flash memory technology will need to evolve in order to continue to scale and to have a stronger presence in the marketplace

INNOVATION

Researchers at UCLA have invented a robust and simple 3-D structure, VSAT, on a 100nm node for ultra-high-density NAND flash memory devices while improving sub-threshold performance and channel mobility.

APPLICATIONS

A viable candidate for low cost and high density memory

ADVANTAGES

- Low cost to manufacture
- Simplified fabrication process
- Ultra-high-density
- Easy integration with peripheral circuits
- Improved off-current without sacrificing memory density

STATE OF DEVELOPMENT

The 3-D NAND flash memory cell, VSAT, has been successfully developed on the 100nm node. The anticipated storage capacity of VSAT is 128 GB with 16 multiple layers on the 50nm node.

PATENT STATUS

Country	Type	Number	Dated	Case
Republic Of Korea (South Korea)	Issued Patent	10-1759926	07/14/2017	2010-381
United States Of America	Issued Patent	9,048,329	06/02/2015	2010-381
Japan	Issued Patent	5566675	06/27/2014	2010-381
United States Of America	Issued Patent	8,541,832	09/24/2013	2010-381

Additional Patents Pending

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Magnetic Memory Bits with Perpendicular Magnetization Switched By Current-Induced Spin-Orbit Torques

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OTHER INFORMATION

KEYWORDS

Flash memory, solid state drive, transistor

CATEGORIZED AS

- **Semiconductors**
  - Design and Fabrication

RELATED CASES

2010-381-0

- Vsat Structure for Nonvolatile Memory Device
- A Read-Disturbance-Free Nonvolatile Content Adressable Memory
- A Self-Organized Critical CMOS Circuit for Computation and Information Processing
- Anti-Ferromagnetic Magneto-Electric Spin-Orbit Read Logic

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