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3-D Memory

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***Abstract*: Memory has been a close comrade of each and every technical advancement in Information Technology. The current memory technologies have a lot of limitations. These memory technologies when needed to expand will allow expansion only two dimensional space. Hence area required will be increased. Next Generation Memories overcomes all of the limitations of the previous memory. The most important one among them is their ability to support to 3-D space memory. They include MRAM, FeRAM, Polymer Memory.**

3-D memory is the leading technology among them. It is mainly because of their expansion capability in three dimensional spaces. A polymer retains space charges near a metal interface when there is a bias, or electrical current, running across the surface. We can store space charges in a polymer layer, and conveniently check the presence of the space charges to know the state of the polymer layer.

***Keywords*: 3-D, Three Dimensional, TFE, Thin film electronics**

1. Introduction

Think about our previous day when we want your mobile will need far more than the 8k and 16k memory that it has today, or all peoples in world requires laptops memory in gigabytes of memory because of the impact of convergence on the very nature of computing. Digital memory completes these all attribute with Intel's project with Thin Film Electronics ASA (TFE) of Sweden works according to plan. TFE's idea is to use polymer memory modules rather than silicon-based memory modules, and what's more it's going to use architecture that is quite different from silicon-based modules.

2. Literature review

3-D memory is the leading technology among them. It is mainly because of their expansion capability in three dimensional spaces. The fundamental idea of all these technologies is the bistable nature possible for of the selected material which is due to their difference in behavior of internal dipoles when electric field is applied. And they retain those states until an electric field of opposite nature is applied. FeRAM works on the basis of the bistable nature of the centre atom of selected crystalline material. A voltage is applied upon the crystal which in turn polarizes the internal dipoles up or down. I.e. actually the difference between these states is the difference in conductivity.

In this paper until the 1970s and the work of Nobel laureates Alan J. Heeger, Alan G. MacDiarmid and Hideki Shirakawa, polymers were only considered to be insulators. Heeger et al showed that polymers could be conductive. Electrons were removed, or introduced, into a polymer consisting of alternately single and double bonds between the carbon atoms. As these holes or extra electrons are able to move along the molecule, the structure becomes electrically conductive.

3. Methodology

To represent a digital memory device means a way to represent the ones and zeros of computer logic, devising a relatively convenient way to retrieve these binary patterns from storage, and making sure the information remains stable. Polymer memory stores information in an entirely different manner than silicon devices. Rather than encoding zeroes and ones as the amount of charge stored in a cell, Coatue's chips store data based on the polymer's electrical resistance. Using technology licensed from the University of California, Los Angeles, and the Russian Academy of Sciences in Novosibirsk, Coatue fabricates each memory cell as a polymer sandwiched between two electrodes. To activate this cell structure, a voltage is applied between the top and bottom electrodes, modifying the organic material. Different voltage polarities are used to write and read the cells. Application of an electric field to a cell lowers the polymer's resistance, thus increasing its ability to conduct current; the polymer maintains its state until a field of opposite polarity is applied to raise its resistance back to its original level. The different conductivity States represent bits of information. A polymer retains space charges near a metal interface when there is a bias, or electrical current, running across the surface. These charges come either from electrons, which are negatively charged, or the positively-charged holes vacated by electrons. We can store space charges in a polymer layer, and conveniently check the presence of the space charges to know the state of the polymer layer.

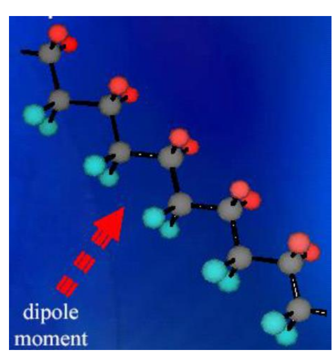

Fig. 1. The alignment of local dipoles within a polymer chain

A. Memory architecture

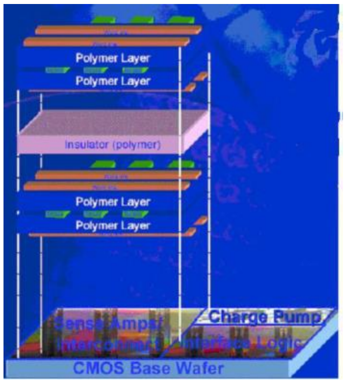

Fig. 2. Memory Architecture

3-D memory known as Polymer memory. polymer microelectronics is potentially far less expensive to make than silicon devices. Instead of multibillion-dollar fabrication equipment that etches circuitry onto a silicon wafer, manufacturers could event ink jet printers to spray liquid-polymer circuits onto a surface. Polymer memory comes with an added bonus: unlike the memory in your PC, it retains information even after the power is shut off.

B. Manufacture

With Thin Film's memory technology, polymer solutions can be deposited on flexible substrates with industry standard processes like spin coating in ultra-thin layers. Using an all-organic architecture, the Thin Film memory system is suitable for roll-to-roll manufacture. This is a continuous production method where a substrate is wound from one reel to another while being processed. The basic premise is to exploit the fact that polymers can be handled as liquids and, at a later stage, printed directly with the cross matrices of electrodes, thus allowing square meters of memory and processing devices to be produced by the second. This can be taken even further by the use of simple ink-jet printers. Such printers, with modified printer heads, will have the capability to print complete memory chips at the desktop in the future. With the Thin Film technology, there are no individual components that must be assembled in a purpose-built factory, nor is the technology limited to a particular substrate.

4. Conclusion

This project helpful for recently digitization systems which we use generally in our daily life and reducing manual efforts. The fundamental strength, i.e. the stacking of memory layers which yields maximum storage capacity in a given footprint is the main reason why 3-D memory or Polymer memory is highly preferred. Data can't be rewritten so suitable for permanent storage. It also retains data without power.

References

[1] Majumdar, Himadri & Bandyopadhyay, Anirban & Bolognesi, Alberto & Pal, Amlan. (2002). Memory Device Applications of a Conjugated Polymer: Role of Space Charges. Journal of Applied Physics. 91. 2433-2437.
[2] Nagaraja, Lohith, S NagarjunR., Nishanth M Anand, D. Kanishka Nithin and V. Sreerama Murthy. "Vision based Text Recognition using Raspberry Pi." (2015).
[3] Zhang, Xinyu; Mac Diarmid, Alan G.; Manohar, Sanjeev K. (2005).
[4] "Chemical synthesis of PEDOT nanofibers". Chemical Communications (42):5328-30.
[5] A. Prakash, J. Ouyang, and J. Lin, "Polymer memory device based on cogugated polymer and gold nanoparticles," J. Appl. Phys.., vol. 100, no.5 pp. 1-5, 2006.
[6] Dimitrios Dakopoulos and Nikolaos G. Bourbakis Wearable Obstacle Avoidance Electronic Travel Aids for Blind IEEE Transactions on systems, man and cybernetics, Part C (Applications and Reviews). Vol. 40, issue 1, Jan. 2010.
[7] William A. Ainsworth A system for converting English text into speech IEEE Transactions on Audio and Electroacoustics, Vol. 21, Issue 3, June 1973
[8] Michael Mc Enancy Finger Reader Is audio reading gadget for Index Finger IJECCE Vol. 5, Issue 4 July 2014.
[9] C. Perlov, W. Jackson, C. Taussig, S. Mo, and S. R. Forrest," A polymer/semiconductor write-once read- many-times memory," Nature, vol. 426, November 2003.