



Unity Semiconductor

Unity Semiconductor, a memory technology company, is developing an innovative non-volatile solid state memory to replace NAND in the \$20 billion and growing market for flash memory in electronic devices. With eight years of development history, Unity's memory technology, CMOx™, is designed to scale beyond the limitations of the legacy transistor technology currently used in NAND flash memory. CMOx™ memory will have faster performance, lower manufacturing costs and greater data reliability. As part of its business model, Unity plans to provide its team's technology production know-how to memory semiconductor companies as part of a broad licensing program. The company will also engage in direct sales of custom solid state memory for the enterprise and cloud storage markets. Unity, which has the backing of leading venture capital firms, is in a two-year joint development program with Micron Technology to prepare CMOx™ for commercialization.

The Future of NAND

Flash memory using NAND technology is a non-volatile computer storage chip that can be electrically erased and reprogrammed. With no power required to maintain the information stored in the chip, this form of memory is arguably the most important enabling technology in electronics today, without which smartphones and other mobile devices could not exist. Now the technology is reaching its physical limitations threatening continued progress in the development of mobile and computing devices. Flash memory uses special transistors, each of which holds an electrical charge and stores bits of information. As transistors become very small (20nm and below), they encounter limitations inherent in the fundamental laws of physics. The result is an electrical charge that is unreliable. When charge is lost, the data is lost. The issue of data loss is increasingly critical as solid state memory becomes the residence of operating systems, as is the case with smartphones and tablets. In these devices, data loss results in system failure.

CMOx™ Cross-point Memory

CMOx™ memory incorporates a new materials technology and design that is completely different from the legacy transistor-based flash memory. CMOx™ combines a conductive metal oxide with an insulating metal oxide fabricated in a three-dimensional cross point array to create a memory effect that unlike transistors, transfers electrical charges using ions and not electrons. The ions are held in CMOx™'s crystalline structure, allowing them to create a memory effect under electrical charge with greater speed and reliability while avoiding the loss of charge and cell degradation that occurs with transistor-based NAND at 20 nanometer and below. Current projections indicate that CMOx™ can be scaled and carry an order of magnitude more charge carriers in the same volume of cell as NAND, enabling the technology to deliver greater reliability and lower cost per gigabyte. Just as importantly, the innovative vertical multi-layer cross point array creates greater storage density and thus more gigabytes per chip. Several other memory replacement technologies are in development stage, but CMOx™ with its superior design and memory cell IP, is anticipated to offer significant scale, density, reliability and cost benefits.