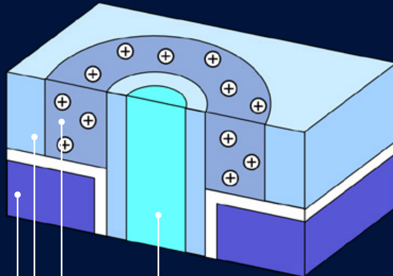
neo semiconductor

Next Gen Memory Technologies

3D X-DRAM™

Ultra High Capacity, Ultra High Density
World's First 3D NAND-Like DRAM Array

Floating Body Cell



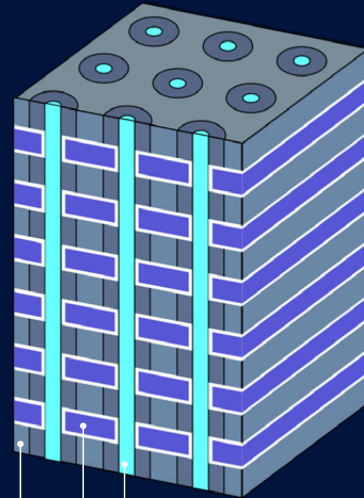
Bit Line: connects to read/write circuit.

Floating Body: stores electric charges to represent data.

Source Line: connects to ground.

Word Line: selects the cell for read/write operation.

3D NAND-like Array



Vertical Bit Line

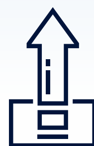
Word Line Layer

Source Line Layer

3D X-DRAM™ is an industry game-changer. It is based on floating body cell (FBC) technology, so data is stored as electric charges without capacitors. An innovative structure similar to 3D NAND flash makes 3D X-DRAM™ easier to manufacture and less expensive to scale than emerging 3D DRAM alternatives. 3D X-DRAM™ using multiple-level 3D arrays, so 8x higher capacities can be achieved using the same number of layers (230) used for 3D NAND.

Adopting 3D X-DRAM™ Technologie allows memory manufacturers to leverage their current technologies, nodes and processes to increase the density and capacity of main memory used in information technology (IT) systems and consumer products. This results in:

Higher performance for cloud and business systems (e.g., servers)



Smaller form factors for consumer devices (e.g., smartphones)

More capabilities for edge computing devices (e.g., routers)

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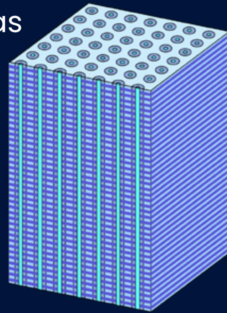
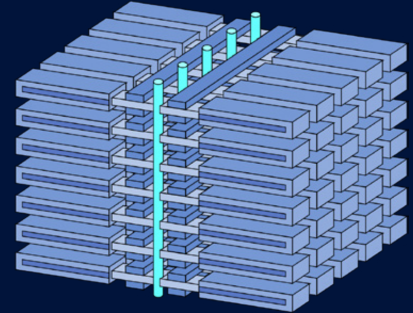
3D X-DRAM™ is Simple

3D X-DRAM™ cell has only one transistor (1T) formed in 3D NAND-like simple structure.



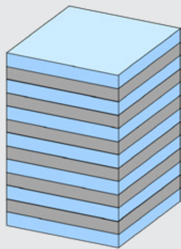
Other 3D DRAM is Complicated

Other 3D DRAM cell has one transistor and one capacitor (1T1C) formed in much more complicated structure.

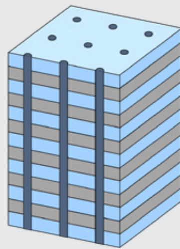


3D X-DRAM™ Manufacturing in 8-steps

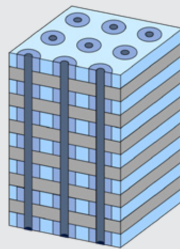
1 Deposit Multiple Layers



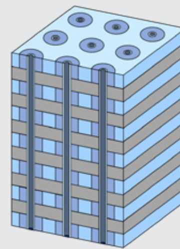
2 Deep Trench Bit Line Holes



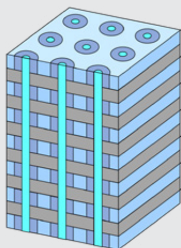
3 Plasma Doping for Floating Body



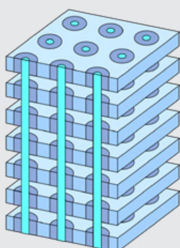
4 Deposit Poly- silicon Layers



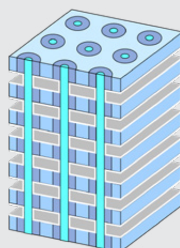
5 Metal Fill Bit Line Holes



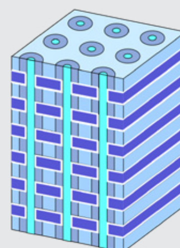
6 Wet Etch Nitride Layers



7 Deposit Gate Oxide Layers



8 Deposit Metal Word Lines



- ✓ Existing Process
- ✓ 1 Mask Only
- ✓ Self-Aligned
- ✓ High Yield
- ✓ High Density
- ✓ High Speed
- ✓ Low Cost