

Dimension Increase in Metal-Oxide-Semiconductor Memories and Transistors

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1. Introduction
2. Grown-junction bipolar transistor as 1-D structure
3. Invention of trench-capacitor DRAM cell as a quasi-3-D structure
 - 3.1 Advent of DRAM
 - 3.2 Key factor of cost
 - 3.3 Invention of trench-capacitor DRAM cell
 - 3.4 Changes of trench cell employment
 - a. Oxide uniformity
 - b. Trench to trench leakage
 - c. Soft-error
 - 3.5 DRAM cell trend
 - 3.6 Material revolution
4. Two- and three-dimensional MOS transistors
 - 4.1 Innovation of 2-D transistors
 - 4.2 Proposals of quasi 3-D transistors
 - 4.3 Proposal of 3-D transistors
 - 4.4 A vertical transistor having a potential of $2F^2$ cell area
 - 4.5 Prospect of vertical 3-D transistor
5. Other approaches to 2.5-D stack LSI
6. Conclusion
7. Acknowledgements
8. References