



Dynamic RAM: Technology Advancements

By Muzaffer A. Siddiqi

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Because of their widespread use in mainframes, PCs, and mobile audio and video devices, DRAMs are being manufactured in ever increasing volume, both in stand-alone and in embedded form as part of a system on chip. Due to the optimum design of their components?access transistor, storage capacitor, and peripherals?DRAMs are the cheapest and densest semiconductor memory currently available. As a result, most of DRAM structure research and development focuses on the technology used for its constituent components and their interconnections. However, only a few books are available on semiconductor memories in general and fewer on DRAMs.

Dynamic RAM: Technology Advancements provides a holistic view of the DRAM technology with a systematic description of the advancements in the field since the 1970s, and an analysis of future challenges.

Topics Include:

- DRAM cells of all types, including planar, three-dimensional (3-D) trench or stacked, COB or CUB, vertical, and mechanically robust cells using advanced transistors and storage capacitors
- Advancements in transistor technology for the RCAT, SCAT, FinFET, BT FinFET, Saddle and advanced recess type, and storage capacitor realizations
- How sub 100 nm trench DRAM technologies and sub 50 nm stacked DRAM technologies and related topics may lead to new research
- Various types of leakages and power consumption reduction methods in active and sleep mode
- Various types of SAs and yield enhancement techniques employing ECC and redundancy

A worthwhile addition to semiconductor memory research, academicians and researchers interested in the design and optimization of high-density and cost-efficient DRAMs may also find it useful as part of a graduate-level course.



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Editorial Review

Review

"The book represents an ultimate guide to DRAM technology for students as well as lecturers or experts in the field . . . It offers detailed descriptions of technology advancements together with motivations, focusing on cell topology, critical technological issues such as advanced lithography and patterning, new materials introduction and the evolved physics affecting cell parameters, as well as memory peripheral circuits in the system level . . . As a researcher working in the field related to new materials for DRAM cell capacitors, this book offers me a clear and complete view of DRAM technology and its advances, providing not only specifications, requirements, and restrictions but also a necessary deeper understanding of related physics and functionality issues."

?Dr. Milan Tapajna, Institute of Electrical Engineering, Slovak Academy of Sciences

"The main strength of this material is a good overview of all nearly relevant literature on DRAM cell development of the recent years."

?Till Schloesser, Infineon Technologies, Germany

"Quite a comprehensive treatment of regular DRAM technology but it ignores the new demands of wide I/O DRAM and the effects of packaging – e.g. through-silicon vias reducing signal losses and thus lowering power. . . definitely a good historical survey and the lists of reference should be very useful to anyone researching the topic."

?Dick James, Chipworks Inc., Ottawa, Ontario, Canada

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