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Collana	Electronics engineering series
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Note generali	Description based upon print version of record.
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Nota di contenuto	Cover; Title Page; Copyright; Contents; Acknowledgments; Preface; PART 1: Information Storage and the State of the Art of Electronic Memories; 1: General Issues Related to Data Storage and Analysis Classification of Memories and Related Perspectives; 1.1. Issues arising from the flow of digital information; 1.2. Current electronic memories and their classification; 1.3. Memories of the future; 2: State of the Art of DRAM, SRAM, Flash, HDD and MRAM Electronic Memories; 2.1. DRAM volatile memories; 2.1.1. The operating principle of a MOSFET (metal oxide semiconductor field effect transistor) 2.1.2. Operating characteristics of DRAM memories 2.2. SRAM memories; 2.3. Non-volatile memories related to CMOS technology; 2.3.1. Operational characteristics of a floating gate MOSFET; 2.3.1.1. How to charge and discharge the floating gate?; 2.3.1.2. Physical problems related to the storage of electrical charges and their impact on the operation of a floating gate memory; 2.3.1.2.1. Charge retention; 2.3.1.2.2. Problems related to writing and electron injection; 2.3.1.3. Multilevel cells 2.3.1.4. The quality of dielectrics: one of the reasons behind the limitation of floating gate memory performances 2.3.1.5. The "Achille's heel" of floating gate memories; 2.3.2. Flash memories; 2.3.2.1. NOR and NAND Flash memories; 2.3.2.2. General organization of NAND

Flash memories; 2.3.2.3. Perspectives for Flash memories; 2.4. Non-volatile magnetic memories (hard disk drives - HDDs and MRAMs); 2.4.1. The discovery of giant magneto resistance at the origin of the spread of hard disk drives; 2.4.1.1. GMR characteristics; 2.4.2. Spin valves; 2.4.3. Magnetic tunnel junctions; 2.4.4. Operational characteristics of a hard disk drive (HDD); 2.4.5. Characteristics of a magnetic random access memory (MRAM); 2.5. Conclusion; 3: Evolution of SSD Toward FeRAM, FeFET, CTM and STT-RAM Memories; 3.1. Evolution of DRAMs toward ferroelectric FeRAMs; 3.1.1. Characteristics of a ferroelectric material; 3.1.2. Principle of an FeRAM memory; 3.1.3. Characteristics of an FeFET memory; 3.1.3.1. Retention characteristics; 3.1.3.2. Ferroelectric materials other than oxides?; 3.2. The evolution of Flash memories towards charge trap memories (CTM); 3.3. The evolution of magnetic memories (MRAM) toward spin torque transfer memories (STT-RAM); 3.3.1. Nanomagnetism and experimental implications; 3.3.2. Characteristics of spin torque transfer; 3.3.3. Recent evolution with use of perpendicular magnetic anisotropic materials; 3.4. Conclusions; PART 2: The Emergence of New Concepts: The Inorganic NEMS, PCRAM, ReRAM and Organic Memories; 4: Volatile and Non-volatile Memories Based on NEMS; 4.1. Nanoelectromechanical switches with two electrodes; 4.1.1. NEMS with cantilevers; 4.1.1.1. Operation and memory effect of an NEMS with a cantilever; 4.1.1.2. Description of the elaboration technique

Sommario/riassunto

Written for scientists, researchers, and engineers, *Non-volatile Memories* describes the recent research and implementations in relation to the design of a new generation of non-volatile electronic memories. The objective is to replace existing memories (DRAM, SRAM, EEPROM, Flash, etc.) with a universal memory model likely to reach better performances than the current types of memory: extremely high commutation speeds, high implantation densities and retention time of information of about ten years.

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Descrizione fisica	1 online resource (200 p.)
Altri autori (Persone)	ChenYiran <1976->
Disciplina	004.568 621.39732
Soggetti	Semiconductor storage devices Magnetic memory (Computers) Flash memories (Computers) Change of state (Physics) - Industrial applications
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Nota di contenuto	1. Introduction to semiconductor memories -- 2. Phase change memory -- 3. Spin-transfer torque RAM -- 4. Resistive random access memory -- 5. Memristors -- 6. The future of nonvolatile memory.
Sommario/riassunto	The manufacture of flash memory, which is the dominant nonvolatile memory technology, is facing severe technical barriers. So much so, that some emerging technologies have been proposed as alternatives to flash memory in the nano-regime. Nonvolatile Memory Design: Magnetic, Resistive, and Phase Changing introduces three promising candidates: phase-change memory, magnetic random access memory, and resistive random access memory. The text illustrates the fundamental storage mechanism of these technologies and examines their differences from flash memory techniques. Based on the latest advances,