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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.
