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| Nota di contenuto       | Silicon Non-Volatile Memories; Table of Contents; Preface; Chapter 1. Introduction; Chapter 2. Semiconductor Industry Overview; 2.1. The cyclical semiconductor market; 2.2. The leading IC companies; 2.3. The world IC market distribution; 2.4. Semiconductor sales by IC devices; 2.5. The semiconductor memory market; 2.6. The impressive price decline of IC circuits; 2.7. Moore's Law, the ITRS and their economic impacts; 2.8. Exponential growth of manufacturing and R&D costs; 2.9. The structural evolution of the semiconductor industry; 2.10. Consolidation of the semiconductor memory sector<br>2.11. Conclusions2.12. References; Chapter 3. Research on Advanced Charge Storage Memories; 3.1. Key features of Flash technology; 3.2. Flash technology scaling; 3.3. Innovative paths in silicon NVM technologies; 3.4. Research on advanced charge storage memories; 3.4.1. Silicon nanocrystal memories; 3.4.2. Silicon nanocrystal memories with high-k IPDs; 3.4.3. Hybrid silicon nanocrystal/SiN |

memories with high-k IPDs; 3.4.4. Silicon nanocrystal double layer memories with high-k IPDs; 3.4.5. Metal nano-dots coupled with organic templates; 3.4.6. High-k IPD-based memories 3.4.7. High-k/metal gate stacks for "TANOS" memories 3.4.8. FinFlash devices; 3.4.9. Molecular charge-based memories; 3.4.10. Effects of the few electron phenomena; 3.5. Conclusions; 3.6. References; Chapter 4. Future Paths of Innovation; 4.1. 3D integration of charge-storage memories; 4.2. Alternative technologies; 4.2.1. Ferro RAMs; 4.2.2. Magnetic RAMs; 4.2.3. Phase-change RAMs; 4.2.4. Conductive bridging RAMs; 4.2.5. Oxide resistive RAMs; 4.2.6. New crossbar architectures; 4.3. Conclusion; 4.4. References; Chapter 5. Conclusions; 5.1. References; Index

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## Sommario/riassunto

This book provides a comprehensive overview of the different technological approaches currently being studied to fulfill future memory requirements. Two main research paths are identified and discussed. Different "evolutionary paths" based on new materials and new transistor structures are investigated to extend classical floating gate technology to the 32 nm node. "Disruptive paths" are also covered, addressing 22 nm and smaller IC generations. Finally, the main factors at the origin of these phenomena are identified and analyzed, providing pointers on future research activities and developme

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