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model; Appendix D. Matrix elements beyond the envelope function approximation; Appendix E. Charge density produced by a perturbation potential.

Sommario/riassunto

"Written from an engineering standpoint, this book provides the theoretical background and physical insight needed to understand new and future developments in the modeling and design of n- and p-MOS nanoscale transistors. A wealth of applications, illustrations and examples connect the methods described to all the latest issues in nanoscale MOSFET design. Key areas covered include: Transport in arbitrary crystal orientations and strain conditions, and new channel and gate stack materials All the relevant transport regimes, ranging from low field mobility to quasi-ballistic transport, described using a single modeling framework Predictive capabilities of device models, discussed with systematic comparisons to experimental results"--

"The traditional geometrical scaling of the CMOS technologies has recently evolved in a generalized scaling scenario where material innovations for different intrinsic regions of MOS transistors as well as new device architectures are considered as the main routes toward further performance improvements. In this regard, high- κ dielectrics are used to reduce the gate leakage with respect to the SiO₂ for a given drive capacitance, while the on-current of the MOS transistors is improved by using strained silicon and possibly with the introduction of alternative channel materials. Moreover, the ultra-thin body Silicon-On-Insulator (SOI) device architecture shows an excellent scalability even with a very lightly doped silicon film, while non-planar FinFETs are also of particular interest, because they are a viable way to obtain double-gate SOI MOSFETs and to realize in the same fabrication process n-MOS and p-MOS devices with different crystal orientations"

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