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| Nota di contenuto | PREFACE; CONTENTS; Monte-Carlo Simulation of Ultra-Thin Film Silicon-on-Insulator MOSFETs; 1. Introduction; 2. Ensemble Monte Carlo simulators; 2.1. Quantum correction methods; 2.1.1. The effective potential method; 2.1.2. The density gradient method; 2.1.3. The effective conduction band edge (ECBE) method; 2.1.4. The multivalley effective conduction band edge approach (MV-ECBE); 2.2. Multisubband-Ensemble Monte Carlo method; 2.3. Multisubband-Ensemble Monte Carlo validation; 3. Optimization of ultrathin fully-depleted SOI transistors with ultrathin buried oxide (BOX)<br>4. Orientation effects in ultra-short channel DGSOI devices4.1. DGSOI drain current dependence on crystallographic orientation; Acknowledgments; References; Analytical Models and Electrical Characterisation of Advanced MOSFETs in the Quasi Ballistic Regime; 1. Introduction; 2. The Natori - Lundstrom models of Quasi Ballistic Transport; 2.1. The Natori model of ballistic transport; 2.2. Injection velocity and subband engineering; 2.3. Lundstrom models of backscattering; 3. Beyond the Natori-Lundstrom model<br>3.1. Theoretical foundations of the Natori Lundstrom model: the quasi ballistic drift-diffusion theory3.2. Comparison with Monte Carlo |

simulations: results and discussion; 4. Electrical Characterization of MOSFETs in the Quasi Ballistic Regime; 4.1. Introduction & State of the art; 4.2. Principle of backscattering coefficient extraction in the linear regime; 4.3. Results and discussion; 5. Conclusions; Acknowledgments; References; Physics Based Analytical Modeling of Nanoscale Multigate MOSFETs; 1. Introduction; 2. Modeling of DG MOSFETs Based on Conformal Mapping Techniques
2.1. Conformal Mapping2.2. Inter-Electrode and Subthreshold Electrostatics in DG MOSFETs; 2.2.1. Corner correction; 2.2.2. Effect of subthreshold minority carriers near source and drain; 2.2.3. Verification of subthreshold electrostatics; 2.2.4. Subthreshold drain current; 2.2.5. Subthreshold capacitances; 2.3. Self-Consistent Electrostatics at and above Transition in DG MOSFETs; 2.3.1. Transition voltage; 2.3.2. Above-transition electrostatics; 2.3.3. Drain current; 2.3.4. Above-threshold capacitances; 3. Modeling of Circular Gate MOSFETs
3.1. Subthreshold Electrostatics of GAA MOSFETs Based on 2D Solutions3.2. Subthreshold Modeling of CirG MOSFETs; 3.3. Above-Threshold Modeling of CirG MOSFETs; 4. Unified Analytical Modeling of MugFETs; 4.1. Isomorphic Modeling of CirG and SqG MOSFETs in Subthreshold; 4.1.1. A simple long-channel model; 4.1.2. Short-channel modeling of CirG and SqG devices in subthreshold; 4.1.3. Rectangular gate and trigate MOSFETs; 4.2. Modeling of GAA MOSFETs in Strong Inversion; 4.2.1. Strong inversion electrostatics in DG MOSFETs; 4.2.2. Strong inversion electrostatics in SqG MOSFETs
4.2.3. Strong inversion charge, drain current and capacitances

Sommario/riassunto

This book consists of four chapters to address at different modeling levels for different nanoscale MOS structures (Single- and Multi-Gate MOSFETs). The collection of these chapters in the book are attempted to provide a comprehensive coverage on the different levels of electrostatics and transport modeling for these devices, and relationships between them. In particular, the issue of quantum transport approaches, analytical predictive 2D/3D modeling and design-oriented compact modeling. It should be of interests to researchers working on modeling at any level, to provide them with a clear exp