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Titolo	Silicon nanocrystals [[electronic resource]] : fundamentals, synthesis and applications / / edited by Lorenzo Pavesi and Rasit Turan
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Altri autori (Persone)	PavesiLorenzo TuranRasit
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Nota di contenuto	Silicon Nanocrystals: Fundamentals, Synthesis and Applications; Contents; List of Contributors; 1 Introduction; References; 2 Electronic and Optical Properties of Silicon Nanocrystals; 2.1 Introduction; 2.2 Ab Initio Calculation for Small Nanocrystals; 2.2.1 Hydrogenated Silicon Nanocrystals; 2.2.2 Oxidized Silicon Nanocrystals; 2.2.3 Doped Silicon Nanocrystals; 2.2.3.1 Single-Doped Silicon Nanocrystals; 2.2.3.2 Codoped Silicon Nanocrystals; 2.2.4 Silicon Nanocrystals Embedded in a SiO2 Matrix; 2.3 Pseudopotential Calculations for Large Nanocrystals; 2.3.1 Effective Optical Gap 2.3.2 Radiative Lifetime2.3.3 Linear Optical Absorption; 2.3.3.1 Interband Absorption; 2.3.3.2 Intraband Absorption; 2.3.3.3 Excited State Absorption; 2.3.4 Third-Order Nonlinear Optical Properties; 2.3.5 Quantum-Confined Stark Effect in Si Nanocrystals; References; 3 Optical Properties of Intrinsic and Shallow Impurity-Doped Silicon Nanocrystals; 3.1 Introduction; 3.2 PL Properties of Intrinsic Silicon Nanocrystals; 3.2.1 Fundamental Properties; 3.2.2 Effect of Size and

Shape Distribution on the PL Bandwidth; 3.2.3 Resonant Quenching of PL Band Due to Energy Transfer
3.2.4 PL Quantum Efficiency of Intrinsic Si Nanocrystals3.3 Shallow Impurity-Doped Si Nanocrystals; 3.3.1 Preparation of Impurity-Doped Si Nanocrystals; 3.3.2 PL from B-Doped Si Nanocrystals; 3.3.3 PL from P-Doped Si Nanocrystals; 3.3.4 Electron Spin Resonance Studies of Shallow Impurity-Doped Si Nanocrystals; 3.3.5 Location of Dopant Atoms; 3.4 P and B Codoped Si Nanocrystals; 3.4.1 PL Properties of P and B Codoped Si Nanocrystals; 3.4.2 PL Lifetime of P and B Codoped Si Nanocrystals; 3.4.3 Codoped But Not Compensated Si Nanocrystals; 3.5 Summary; References
4 Electrical Transport Mechanisms in Ensembles of Silicon Nanocystallites4.1 Introduction; 4.2 Background; 4.2.1 Basic Concepts Associated with Transport and Quantum Dots; 4.2.2 Previous Studies of Transport in Systems of Si; 4.3 Experimental Details; 4.4 Experimental Results and Their Interpretation; 4.4.1 The Low-x Regime; 4.4.2 The Low-x to Intermediate-x Transition Regime; 4.4.3 The Intermediate-x Regime; 4.4.4 The Percolation Threshold Regime; 4.4.5 The High-x Regime; 4.5 Discussion and Overview; References; 5 Thermal Properties and Heat Transport in Silicon-Based Nanostructures
5.1 Introduction5.2 Thermal Conductivity in Bulk Solids and Nanostructures; 5.2.1 Kinetic Theory: Thermal Properties and Heat Flow; 5.2.2 Lattice Thermal Conductivity; 5.2.3 Electronic Thermal Conductivity; 5.3 Measurements of Thermal Conductivity in Nanostructures; 5.3.1 The 3 Method; 5.3.2 In-Plane Thermal Conductivity Measurements; 5.3.3 Pump-Probe and Other Optical Measurements; 5.3.4 Raman Scattering and Thermal Conductivity; 5.4 Thermal Properties of Si-Based Nanostructures; 5.4.1 Two- and One-Dimensional Si Nanostructures: Si-on-Insulator and Si Nanowires
5.4.2 Epitaxially Grown Si/SiGe Nanostructures: Superlattices and Cluster Multilayers

Sommario/riassunto

This unique collection of knowledge represents a comprehensive treatment of the fundamental and practical consequences of size reduction in silicon crystals.This clearly structured reference introduces readers to the optical, electrical and thermal properties of silicon nanocrystals that arise from their greatly reduced dimensions. It covers their synthesis and characterization from both chemical and physical viewpoints, including ion implantation, colloidal synthesis and vapor deposition methods. A major part of the text is devoted to applications in microelectronics as well as photonics

2. Record Nr. UNINA9910703640903321

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