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Nota di contenuto	Plasma Nanoscience; Contents; Preface; Acronyms; 1 Introduction; 1.1 Main Concepts and Issues; 1.2 Self-Organized Nanoworld, Commonsense Science of the Small and Socio-Economic Push; 1.3 Nature's Plasma Nanofab and Nanotechnology Research Directions; 1.4 Deterministic Nanofabrication and Plasma Nanoscience; 1.5 Structure of the Monograph and Advice to the Reader; 2 What Makes Low-Temperature Plasmas a Versatile Nanotool?; 2.1 Basic Ideas and Major Issues; 2.2 Plasma Nanofabrication Concept; 2.3 Useful Plasma Features for Nanoscale Fabrication 2.4 Choice and Generation of Building and Working Units2.5 Effect of the Plasma Sheath; 2.6 How Plasmas Affect Elementary Surface Processes; 2.7 Concluding Remarks; 3 Specific Examples and Practical Framework; 3.1 Semiconducting Nanofilms and Nanostructures; 3.2 Carbon-Based Nanofilms and Nanostructures; 3.3 Practical Framework - Bridging Nine Orders of Magnitude; 3.4 Concluding Remarks; 4 Generation of Building and Working Units; 4.1 Species in Methane-

Based Plasmas for Synthesis of Carbon Nanostructures; 4.1.1 Experimental Details; 4.1.2 Basic Assumptions of the Model
4.1.3 Particle and Power Balance in Plasma Discharge4.1.4 Densities of Neutral and Charged Species; 4.1.4.1 Effect of RF Power; 4.1.4.2 Effect of Argon and Methane Dilution; 4.1.5 Deposited Neutral and Ion Fluxes; 4.1.6 Most Important Points and Summary; 4.2 Species in Acetylene-Based Plasmas for Synthesis of Carbon Nanostructures; 4.2.1 Formulation of the Problem; 4.2.2 Number Densities of the Main Discharge Species; 4.2.3 Fluxes of Building and Working Units; 4.3 Nanocluster and Nanoparticle Building Units; 4.3.1 Nano-Sized Building Units from Reactive Plasmas
4.3.2 Nanoparticle Generation: Other Examples4.4 Concluding Remarks; 5 Transport, Manipulation and Deposition of Building and Working Units; 5.1 Microscopic Ion Fluxes During Nanoassembly Processes; 5.1.1 Formulation and Model; 5.1.2 Numerical Results; 5.1.3 Interpretation of Numerical Results; 5.2 Nanoparticle Manipulation in the Synthesis of Carbon Nanostructures; 5.2.1 Nanoparticle Manipulation: Experimental Results; 5.2.2 Nanoparticle Manipulation: Numerical Model; 5.3 Selected-Area Nanoparticle Deposition Onto Microstructured Surfaces; 5.3.1 Numerical Model and Simulation Parameters
5.3.2 Selected-Area Nanoparticle Deposition5.3.3 Practical Implementation Framework; 5.4 Electrostatic Nanoparticle Filter; 5.5 Concluding Remarks; 6 Surface Science of Plasma-Exposed Surfaces and Self-Organization Processes; 6.1 Synthesis of Self-Organizing Arrays of Quantum Dots: Objectives and Approach; 6.2 Initial Stage of Ge/Si Nanodot Formation Using Nanocluster Fluxes; 6.2.1 Physical Model and Numerical Details; 6.2.2 Physical Interpretation and Relevant Experimental Data; 6.3 Binary Si(x)C(1-x) Quantum Dot Systems: Initial Growth Stage
6.3.1 Adatom Fluxes at Initial Growth Stages of Si(x)C(1-x) Quantum Dots

Sommario/riassunto

Filling the need for a single work specifically addressing how to use plasma for the fabrication of nanoscale structures, this book is the first to cover plasma deposition in sufficient depth.The author has worked with numerous R&D institutions around the world, and here he begins with an introductory overview of plasma processing at micro- and nanoscales, as well as the current problems and challenges, before going on to address surface preparation, generation and diagnostics, transport and the manipulation of nano units.