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Nota di contenuto	CVD of Compound Semiconductors; Contents; 1 Basic Concepts; 1.1 Introduction; 1.2 Compound Semiconductors; 1.3 Description of the Band Gap; 1.3.1 Density of States; 1.3.2 Extrinsic Semiconductors; 1.3.3 Characterizing Carrier Concentrations; 1.3.4 Direct and Indirect Band Gaps; 1.3.5 Photoluminescence Spectroscopy; 1.3.6 p-n Junctions; 1.4 General Structural Properties of Compound Semiconductors; 1.5 Applications of III-V Semiconductors; 1.5.1 Light Emitting Diodes; 1.5.2 Solid State Lasers; 1.6 Structural Properties and Applications of II-VI Semiconductors; 1.7 III-VI Semiconductors 1.8 Vapor Phase Techniques1.8.1 Methods of Crystal Growth; 1.8.2 Historical Perspective; 1.8.3 Basic Principles of MOVPE, CBE and ALE; 1.8.3.1 Metalorganic Vapor Phase Epitaxy (MOVPE); 1.8.3.2 Chemical Beam Epitaxy; 1.8.3.3 Photoassisted Processes; 1.8.3.4 Atomic Layer Epitaxy (ALE); 1.9 References; 2 Precursor Chemistry; 2.1 Introduction; 2.2 Group IIIA Metalorganic Precursors; 2.2.1 Aluminum Chemistry; 2.2.2 Gallium; 2.2.3 Indium; 2.2.4 Group III Metal Alkyl Adducts; 2.2.5 Metalorganic Precursor Purity; 2.3 Analysis Techniques; 2.3.1 Determination of Trace Metal Impurities

2.3.2 Determination of Organic Impurities2.3.3 Identification of Impurities in the Semiconductor Layer; 2.4 Purification of Group III Trialkyl Compounds; 2.4.1 Classical Purification Techniques; 2.4.2 Adduct Purification Techniques; 2.5 Group II Metalorganic Precursors; 2.5.1 Dialkylzinc Compounds; 2.5.2 Other Group II Metalorganic Precursors; 2.6 Purification of Group II Precursors; 2.6.1 Adduct Purification of Group II Metalorganic Precursors; 2.7 Compounds of Phosphorus, Arsenic and Antimony; 2.7.1 Alkylarsenic Compounds; 2.7.2 Alkyl Phosphorus Hydrides; 2.7.3 Alkylantimony Compounds 2.8 Group VI Metalorganic Precursors2.8.1 Compounds of Sulfur, Selenium, and Tellurium; 2.9 Thermal Stability of Metalorganic Precursors; 2.9.1 DSC Data for Group III Metalorganics; 2.9.2 Base-Free Trialkyls, R3M; 2.9.3 Adducts of Group III Trialkyls; 2.9.4 Precursors Containing an Al-Hydride Bond; 2.9.5 DSC Data for Group II Alkyls; 2.9.6 Conclusions; 2.10 References; 3 MOVPE of III-V Compounds; 3.1 Introduction; 3.2 Growth of Gallium Arsenide (GaAs); 3.2.1 Growth Using Conventional Precursors; 3.2.1.1 Me/Ga/AsH3; 3.2.1.2 Et/Ga/AsH3; 3.2.2 Growth of GaAs Using Alternative Ga Precursors 3.2.3 Growth of GaAs Using Alternative As Precursors3.2.3.1 Precursor Requirements; 3.2.3.2 Trialkylarsenic Precursors; 3.2.3.3 Alkylarsenic Hydride Precursors; 3.2.3.4 Alternative Arsenic Precursors Containing Other Functional Groups; 3.3 Growth of Aluminum Gallium Arsenide (AlGaAs); 3.3.1 Growth of AlGaAs Using Conventional Precursors; 3.3.1.1 Carbon Incorporation; 3.3.1.2 Oxygen Incorporation; 3.3.2 Growth of AlGaAs Using Alternative A1 Precursors; 3.3.2.1 AlGaAs Growth Using Methyl-Based Alternatives; 3.3.2.2 AlGaAs Growth Using Ethyl-Based Alternatives
3.3.2.3 AlGaAs Growth Using Higher Al Alkyls

Sommario/riassunto

Chemical growth methods of electronic materials are the keystone of microelectronic device processing. This book discusses the applications of metalorganic chemistry for the vapor phase deposition of compound semiconductors. Vapor phase methods used for semiconductor deposition and the materials properties that make the organometallic precursors useful in the electronics industry are discussed for a variety of materials.Topics included:* techniques for compound semiconductor growth* metalorganic precursors for III-V MOVPE* metalorganic precursors for II-VI MOVPE* si