

1. Record Nr.	UNINA9910830977703321
Autore	Koizumi Satoshi
Titolo	Physics and applications of CVD diamond // Satoshi Koizumi, Christoph Nebel, and Milos Nesladek
Pubbl/distr/stampa	Weinheim, Germany : , : WILEY-VCH Verlag GmbH & Co. KGaA, , 2008 ©2008
ISBN	1-281-94715-6 9786611947156 3-527-62317-5 3-527-62318-3
Descrizione fisica	1 online resource (376 p.)
Disciplina	621.38152
Soggetti	Chemical vapor deposition Diamonds, Artificial
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references at the end of each chapters and index.
Nota di contenuto	Physics and Applications of CVD Diamond; Contents; Preface; 1 Future Perspectives for Diamond; 1.1 The Status Diamond and the Working Diamond; 1.2 On Diamond's Future; 1.3 The Electron in Carbon Country; 1.4 Social Contexts: Twenty-First Century Needs; 1.5 The Biomedical and Life Sciences Context; 1.6 Fusion: Opportunity and Challenge; 1.7 Extending the Information Technologies; 1.8 Can the Quantum be Tamed?; 1.9 Conclusions: Beyond Those Niche Applications; 2 Growth and Properties of Nanocrystalline Diamond Films; 2.1 Introduction; 2.2 Growth; 2.3 Raman Spectra of NCD and UNCD Films 2.4 Optical Properties of UNCD and B-NCD Films 2.5 Doping and Transport Measurements; 2.6 Conclusions; 3 Chemical Vapor Deposition of Homoepitaxial Diamond Films; 3.1 Introduction and Historical Background; 3.1.1 Diamond - A Superior Semiconducting Material; 3.1.2 Low-Pressure Chemical Vapor Deposition; 3.1.3 Homoepitaxial Diamond Films; 3.2 Effects of Process Parameters on Homoepitaxial Diamond Film Quality; 3.2.1 Methane Concentration;

3.2.2 Substrate Temperature; 3.2.3 Total Gas Pressure; 3.2.4 Crystal Orientation; 3.2.5 Misorientation Angle; 3.2.6 Substrate Quality and Preparation Method  
3.2.7 Impurity Doping into Homoepitaxial Diamond  
3.3 Homoepitaxial Diamond Growth by High-Power Microwave-Assisted Chemical Vapor Deposition; 3.3.1 Growth Conditions; 3.3.2 Growth Rate; 3.3.3 Surface Morphology; 3.3.4 Optical Properties; 3.3.5 Boron Doping; 3.3.6 Nitrogen Doping; 3.3.7 Large Area Deposition; 3.4 Conclusions and Perspectives; 4 Heteroepitaxy of Diamond; 4.1 Cubic Boron Nitride; 4.2 Silicon and Silicon Carbide; 4.3 Nickel and Cobalt; 4.4 Platinum; 4.5 Iridium; 4.6 Recent Progress in Heteroepitaxy of Diamond on Iridium; 4.7 Other Trials for Heteroepitaxy of Diamond; 4.8 Summary  
5 Electrochemical Properties of Undoped Diamond  
5.1 Introduction; 5.2 Surface Electronic Properties of Diamond Covered with Adsorbates; 5.2.1 Contact Potential Difference (CPD) Experiments; 5.2.2 Current-Voltage (IV) Properties; 5.2.3 Capacitance-Voltage (CV) Experiments; 5.2.4 Two Dimensional Properties of a Perfectly H-Terminated Diamond Surface; 5.2.5 In-Plane Capacitance-Voltage Properties of Al on H-Terminated Diamond; 5.2.6 Hole Carrier Propagation and Scattering in the Surface Layer; 5.3 Surface Electronic Properties of Diamond in Electrolyte Solutions  
5.3.1 Redox Couple Interactions with Undoped H-Terminated CVD Diamond  
5.3.2 Electrochemical Exchange Reactions of H-Terminated Diamond with Electrolytes and Redox Couples; 5.3.3 Ion Sensitive Field Effect Transistor (ISFET) from Undoped CVD Diamond; 5.4 Discussion and Conclusions; 5.5 Summary; 6 Biosensors from Diamond; 6.1 Introduction; 6.2 Materials and Methods; 6.2.1 CVD Diamond Growth, Surface Modifications and Contact Deposition; 6.2.2 Photochemical Surface Modification of Undoped Diamond; 6.2.3 Electrochemical Surface Functionalization  
6.2.4 HeteroBifunctional CrossLinking and DNA Attachment

---

Sommario/riassunto

Here, leading scientists report on why and how diamond can be optimized for applications in bioelectronic and electronics. They cover such topics as growth techniques, new and conventional doping mechanisms, superconductivity in diamond, and excitonic properties, while application aspects include quantum electronics at room temperature, biosensors as well as diamond nanocantilevers and SAWs. Written in a review style to make the topic accessible for a wider community of scientists working in interdisciplinary fields with backgrounds in physics, chemistry, biology and engineering, this is e

---