Record Nr. UNINA9910830584303321 Autore **Delhaes Pierre** Titolo Carbon science and technology [[electronic resource]]: from energy to materials / / Pierre Delhaes Hoboken, N.J., : ISTE Ltd./John Wiley and Sons Inc, 2012 Pubbl/distr/stampa **ISBN** 1-118-56929-6 1-299-19035-9 1-118-56960-1 1-118-56951-2 Descrizione fisica 1 online resource (222 p.) Collana Materials science series Disciplina 620.193 Soggetti Carbon Lingua di pubblicazione Inglese **Formato** Materiale a stampa Livello bibliografico Monografia Description based upon print version of record. Note generali Nota di bibliografia Includes bibliographical references and index. Nota di contenuto Cover: Carbon Science and Technology: Title Page: Copyright Page: Table of Contents; Introduction; Chemical Glossary; Chapter 1. From the Chemical Element to Solids; 1.1. Carbon on Earth; 1.2. A brief history of the chemistry of carbon; 1.2.1. The first discoveries: fire, heat and metals; 1.2.2. Exploitation of mined resources; 1.2.3. Uses of dispersed carbons: 1.3. Presentation of carbon solids: 1.3.1. Comparison of natural and artificial evolution; 1.3.2. Production and development of carbonaceous products; 1.4. Conclusion and perspectives; 1.5. Bibliography Chapter 2. The Polymorphism of Carbon 2.1. The carbon atom and its chemical bonds; 2.1.1. Chemical bonds and solid phases; 2.1.2. Carbon isotopes; 2.2. A thermodynamic approach; 2.2.1. Some reminders about phenomenonological thermodynamics; 2.2.2. Diagram of equilibrium states of carbon; 2.3. New molecular phases; 2.4. Noncrystalline carbons; 2.4.1. Principal processes; 2.4.2. Evolution and structural characterizations; 2.4.3. Homogeneous massive carbons; 2.4.4. Porous and dispersed carbons; 2.5. From solids to materials; 2.6. Bibliography Chapter 3. Natural Carbons: Energy Source and Carbochemistry 3.1. Primary energy sources; 3.1.1. The various forms of energy; 3.1.2.

Combustion of natural coals; 3.1.3. Manufacturing cements; 3.1.4.

Gasification and liquefaction procedures; 3.2. Carbochemistry; 3.2.1. Intermediary products: coal tar and pitch; 3.2.2. Solid primary materials: cokes and artificial graphites; 3.3. Use of coal resources: 3.3.1. Primary energy source; 3.3.2. The future of carbochemistry and carbonaceous materials; 3.4. Summation and essential points; 3.5. Bibliography; Chapter 4. The Role of Carbon in Metallurgy 4.1. Principles and evolution of the steel industry4.1.1. Industrial manufacturing for cast iron and steel; 4.1.2. Carbons in the steel industry; 4.2. The manufacturing of aluminum; 4.2.1. Electrolysis tank; 4.2.2. Carbons for the aluminum industry; 4.3. Silicon production; 4.3.1. Obtaining metallurgical silicon; 4.3.2. Carbon electrodes; 4.4. Metallic carbides: 4.4.1. Synthesis of acetylene: 4.4.2. Refractory carbides; 4.5. Summary and essential points; 4.6. Bibliography; Chapter 5. Black and White Ceramics; 5.1. Graphites and isotropic carbons; 5.1.1. Manufacturing artificial graphites 5.1.2. General physical properties 5.1.3. Glassy carbons; 5.1.4. Major areas of application; 5.2. Pyrocarbons and pyrographites; 5.2.1. Pyrocarbons (Pyc) obtained via vapor-phase chemical deposit; 5.2.2. Textural and physical characteristics; 5.2.3. Pyrographites and analogs; 5.3. Films of diamond; 5.3.1. Thin layer processes; 5.3.2. Properties and fields of application; 5.4. Summary and essential points; 5.5. Bibliography: Chapter 6. Dispersed and Porous Carbons: 6.1. Carbon blacks; 6.1.1. Formation mechanisms and industrial processes; 6.1.2. Classification and characteristics 6.1.3. Other carbon particles

Sommario/riassunto

Carbon solids have been utilized by man since prehistoric times, first as a source of heat and then for other purposes; these are used as key markers for different civilizations. The essential role played by the use of coal mines during the industrial revolution as a main source of energy is a crucial point, which was then expanded through the development of carbochemistry. This book begins by describing the use of solid carbons as traditional materials, for example in the steel industry and for ceramics, then moving on to their technological uses such as active carbons and carbon fib