1. Record Nr. UNINA9910332860403321

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Titolo La nuova galassia McLuhan : vivere l'implosione del pianeta / Gianpiero

Gamaleri

Pubbl/distr/stampa Roma: Armando, 2013

ISBN 978-88-6677-315-3

Descrizione fisica 221 p. : ill. ; 20 cm

Collana Comunicazione e m@ss-media

Disciplina 302.23092

Locazione FSPBC

Collocazione IX B190

Lingua di pubblicazione Italiano

Formato Materiale a stampa

Livello bibliografico Monografia

Nota di bibliografia Contiene bibl. (pp.213-217)

Record Nr. UNINA9910874673003321 Autore Khovavko Alexander **Titolo** Carbon Nanostructured Materials: Synthesis, Characterization, and Industrial Applications / / by Alexander Khovavko, Eugene Strativnov, Andrii Nebesnyi, Denis Filonenko, Olexiy Sviatenko, Angela Piatova, Maksym Barabash Pubbl/distr/stampa Cham:,: Springer Nature Switzerland:,: Imprint: Springer,, 2024 **ISBN** 9783031641213 9783031641206 Edizione [1st ed. 2024.] Descrizione fisica 1 online resource (163 pages) SpringerBriefs in Materials, , 2192-1105 Collana Altri autori (Persone) StrativnovEugene NebesnyiAndrii FilonenkoDenis SviatenkoOlexiy PiatovaAngela BarabashMaksym Disciplina 620.5 Soggetti Nanotechnology Materials Carbon Chemistry Condensed matter Surfaces (Physics) Fluid mechanics Mathematical models Carbon Materials Two-dimensional Materials Surface and Interface and Thin Film **Engineering Fluid Dynamics** Mathematical Modeling and Industrial Mathematics

Synthesis of Carbon Nanotubes from Products of Hydrocarbons

Lingua di pubblicazione

Livello bibliografico

Nota di contenuto

Formato

Inglese

Monografia

Materiale a stampa

Sommario/riassunto

Conversion by CVD Method -- Design of Modern Equipment for Synthesis of Carbon Nanomaterials -- Production Technology and Application of Materials Based on Thermally Expanded Graphite.

This book provides a concise vet comprehensive look at carbon nanostructured materials, focusing on synthesis methodologies, applications, and fundamental principles. Based on extensive research conducted at the Gas Institute of the National Academy of Sciences of Ukraine, it offers a thorough examination of recent advancements in the field. The book describes various synthesis techniques, particularly emphasizing the continuous synthesis of carbon nanotubes (CNTs) on metal catalysts using chemical vapor deposition (CVD). It also discusses computational fluid dynamics (CFD) modeling of heating processes associated with carbon materials, crucial for understanding the thermodynamics of complex gas systems relevant to CNTs synthesis. Furthermore, the book discusses the structural properties of carbon nanomaterials, employing techniques such as Raman spectroscopy and optical microscopy. It provides detailed insights into the design and optimization of modern equipment for CNTs synthesis, with a focus on energy-efficient reactors for thermally expanded graphite (TEG) production. Beyond synthesis methodologies, the book explores applications of carbon nanomaterials, including their use in lithium-ion batteries, water purification systems, and nuclear reactors. It offers a serious examination of the potential environmental and technological implications of these materials. Comprising three distinct parts, each supplemented with comprehensive summaries, this book serves as a valuable resource for researchers, engineers, and graduate students in material science, thermal engineering, and nanotechnology. It presents empirical findings, theoretical insights, and practical applications, establishing itself as a valuable addition to the literature in the field of carbon nanostructured materials.