

Aerogel-based coating for energy-efficient building envelopes

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Aerogel Based Coating For Energy Efficient Building Envelopes

Jacqueline A. Stagner, David S. K. Ting



Aerogel Based Coating For Energy Efficient Building Envelopes:

Nano and Biotech Based Materials for Energy Building Efficiency F. Pacheco Torgal, Cinzia Buratti, S.

Kalaiselvam, Claes-Göran Granqvist, Volodymyr Ivanov, 2016-02-04 This book presents the current state of knowledge on nanomaterials and their use in buildings ranging from glazing and vacuum insulation to PCM composites It also discusses recent applications in organic photovoltaics photo bioreactors bioplastics and foams making it an exciting read while also providing copious references to current research and applications for those wanting to pursue possible future research directions Derek Clements Croome Emeritus Professor in Architectural Engineering University of Reading From the Foreword Demonstrating how higher energy efficiency in new and existing buildings can help reduce global greenhouse gas emissions this book details the way in which new technologies manufacturing processes and products can serve to abate emissions from the energy sector and offer a cost effective means of improving competitiveness and drive employment Maximizing reader insights into how nano and biotech materials such as aerogel based plasters thermochromic glazings and thermal energy adsorbing glass amongst others can provide high energy efficiency performance in buildings it provides practitioners in the field with an important high tech tool to tackle key challenges and is essential reading for civil engineers architects materials scientists and researchers in the area of the sustainability of the built environment Bio Monomers for Green Polymeric Composite Materials Visakh P. M., Oguz Bayraktar, Gopalakrishnan Menon, 2019-08-22 Presents new and innovative bio based monomers to replace traditional petrochemical based building blocks Featuring contributions from top experts in the field this book discusses new developments in the area of bio monomers and green polymeric composite materials It covers bio monomers green polymeric composites composites from renewable resources bio sourced polymers green composites biodegradation processing methods green polymeric gels and green polymeric membranes Each chapter in Bio Monomers for Green Polymeric Composites Materials presents the most recent research and technological ideas in a comprehensive style It examines bio monomers for green polymer and the processing methods for the bio nanocomposites It covers the preparation characterization and applications of bio polymeric materials based blends as well as the applications of biopolymeric gels in medical biotechnology The book also explores the properties and applications of gelatins pectins and carrageenans gels Additionally it offers a plethora of information on green polymeric membranes the bio degradation of green polymeric composites materials applications of green polymeric composites materials hydrogels used for biomedical applications and the use of natural aerogels as thermal insulations Introduces readers to the innovative new bio based monomers that are taking the place of traditional petrochemical based building blocks Covers green polymers green composites bio sourced polymers bio nanocomposites biodegradable polymers green polymer gels and membranes Features input from leading researchers immersed in the area of study Bio Monomers for Green Polymeric Composites Materials is suitable for academics researchers scientists engineers and advanced students in the field of bio monomers and green

polymeric composites materials **Nanotechnology in Eco-efficient Construction** Fernando Pacheco-Torgal, Maria Vittoria Diamanti, Ali Nazari, Claes Goran-Granqvist, Alina Pruna, Serji Amirkhanian, 2018-11-22 Covering the latest technologies Nanotechnology in eco efficient construction provides an authoritative guide to the role of nanotechnology in the development of eco efficient construction materials and sustainable construction The book contains a special focus on applications concerning concrete and cement as nanotechnology is driving significant development in concrete technologies The new edition has 14 new chapters including 3 new parts Mortars and concrete related applications Applications for pavements and other structural materials and Toxicity safety handling and environmental impacts Civil engineers requiring an understanding of eco efficient construction materials as well as researchers and architects within any field of nanotechnology eco efficient materials or the construction industry will find this updated reference to be highly valuable Addresses issues such as toxicity and LCA aspects New chapters covering safety handling on occupational exposure of nanoparticles and the assessment of personal exposure to airborne nanomaterials Discusses the effects of adding nano particles on the durability and on the properties of geopolymers Proceedings of the 24th International Symposium on Advancement of Construction Management and Real Estate Gui Ye, Hongping Yuan, Jian Zuo, 2021-06-07 This book covers various current and emerging topics in construction management and real estate Papers selected in this book cover a wide variety of topics such as new type urbanization planning and construction of smart city and eco city urban rural infrastructure development land use and development housing market and housing policy new theory and practice of construction project management big data application smart construction and BIM international construction i e belt and road project green building off site prefabrication rural rejuvenation and eco civilization and other topics related to construction management and real estate These papers provide useful references to both scholars and practitioners This book is the documentation of The 24th International Symposium on Advancement of Construction Management and Real Estate which was held in Chongqing China Sustainability through Energy-Efficient Buildings Amritanshu Shukla, Atul Sharma, 2018-03-20 The book covers chapters ranging from introduction to recent technological challenges case studies of energy efficient buildings with policy and awareness issues fundamentals and present status along with research updates and future aspects on topics focusing on energy efficient construction materials Provides comprehensive information on energy efficient buildings including policy and energy audit aspects with case studies Examines application of PCMs in passive heating and cooling in buildings role of active TES and energy saving potential **Towards Net Zero Carbon Emissions in the Building Industry** Ali Sayigh, 2022-11-08 Towards Net Zero in the Building Industry looks at the contributions that the building and construction industry can and must make to help achieve net zero carbon emissions The building industry accounts for close to 40% of global emissions and this book brings together a global group of contributors from 15 countries to examine ways in which the industry can help with overall CO2 reduction Coverage includes factors such as building design

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Unlocking the Potential of Building Envelopes Andrea Giovanni Mainini, Tiziana Poli, Alberto Speroni, Matteo Cavaglià, Juan Diego Blanco Cadena, 2024-12-07 This book delves into the performance based design approach highlighting the necessity for bespoke adaptive and cognitive building envelopes that promote sustainable and positive behaviours throughout their lifecycle A key to unlock the building envelope's potential is the integration of advanced digital tools such as building information modelling BIM and digital twin technology which enable accurate simulation and optimization of energy efficiency decarbonization and human centric design aspects Moreover the work emphasizes the importance of a user centred approach in designing interactive and connected building envelopes thereby fostering sustainable behaviours among occupants This focus on user engagement and education in optimizing building envelope utilization not only contributes to reducing the environmental impact but also enhances the quality of life well being and health of occupants In the era of digital and ecological transition the book serves as an essential guide to design and operate energy efficient responsive and user friendly building envelopes paving the way for a future where the built environment is a significant contributor to sustainability and human health

Advanced Building Envelope Components Francesca Stazi, 2019-06-01 Advanced Building Envelope Components Comparative Experiments focuses on the latest research in innovative materials systems and components also providing a detailed technical explanation on what this breakthrough means for building exteriors and sustainability Topics include a discussion of transparent envelope components including intelligent kinetic skins such as low e coatings high vs low silver content in glass solar control coatings such as silver vs niobium vs tin and more In addition opaque envelope components are also presented including opaque dynamic facades clay lining vs plasterboard and nano clayed foams Includes real case studies that explore in detail the behavior of different envelopes Presents laboratory tests on existing insulation if any through samples extracted on site to quantify actual performances Provides the tools and methods for comparing selecting and testing materials and components for designing effective building envelopes Covers both transparent and opaque envelope components as well as opaque dynamic facades

Cost-Effective Energy Efficient Building Retrofitting F. Pacheco-Torgal, Claes-Göran Granqvist, Bjørn Peter Jelle, Giuseppe Peter Vanoli, Nicola Bianco, Jarek Kurnitski, 2017-01-03 Cost Effective Energy Efficient Building Retrofitting Materials Technologies Optimization and Case Studies provides essential knowledge for civil engineers architects and other professionals working in the field of cost effective energy efficient building retrofitting The building sector is responsible for high energy consumption and its global demand is expected to grow as each day there are approximately 200 000 new inhabitants on planet Earth The majority of electric energy will continue to be generated from

the combustion of fossil fuels releasing not only carbon dioxide but also methane and nitrous oxide Energy efficiency measures are therefore crucial to reduce greenhouse gas emissions of the building sector Energy efficient building retrofitting needs to not only be technically feasible but also economically viable New building materials and advanced technologies already exist but the knowledge to integrate all active components is still scarce and far from being widespread among building industry stakeholders Emphasizes cost effective methods for the refurbishment of existing buildings presenting state of the art technologies Includes detailed case studies that explain various methods and Net Zero Energy Explains optimal analysis and prioritization of cost effective strategies **Building Thermal Envelope** Jorge de Brito,M. Glória Gomes,2020-03-27 This book results from a Special Issue published in Energies entitled Building Thermal Envelope Its intent is to identify emerging research areas within the field of building thermal envelope solutions and contribute to the increased use of more energy efficient solutions in new and refurbished buildings Its contents are organized in the following sections Building envelope materials and systems envisaging indoor comfort and energy efficiency Building thermal and energy modelling and simulation Lab test procedures and methods of field measurement to assess the performance of materials and building solutions Smart materials and renewable energy in building envelope Adaptive and intelligent building envelope and Integrated building envelope technologies for high performance buildings and cities **Energy Modeling and Computations in the Building Envelope** Alexander V. Dimitrov,2015-08-27 Energy Modeling and Computations in the Building Envelope instills a deeper understanding of the energy interactions between buildings and the environment based on the analysis of transfer processes operating in the building envelope components at the microscopic level The author Proposes a generalized physics model that describes these interactions **Nanotechnology in Construction for Circular Economy** Wenhui Duan,Lihai Zhang,Surendra P. Shah,2023-07-24 This open access book covers emerging opportunities and future use of nanotechnology in construction including deep advances in cement chemistry nanotechnology artificial intelligence robotics concrete technology and extreme engineering blast impact and fire The proceedings also presents sectorial interactions within the traditional construction industry supply chain enabled by the dynamic partnership between international industry government agencies and universities Nanotechnology has transformed the construction materials industry into an advanced manufacturing sector to address climate change and carbon neutrality challenges by delivering sustainable and resilient infrastructure assets Hence this book reports specific advances in nanoscience and nano engineering and their impacts on numerous novel construction materials including binders additives high performance concrete materials concrete structural systems polymer composites and pavement materials **Technologies for Integrated Energy Systems and Networks** Giorgio Graditi,Marialaura Di Somma,2022-04-04 Technologies for Integrated Energy Systems and Networks Explore emerging technologies that will play a central role in humanity's transition to a low carbon future In Technologies for Integrated Energy Systems and Networks a team of distinguished authors delivers a

detailed discussion of integrated energy systems and networks including a comprehensive overview of emerging technologies The book focuses on the technologies and systems that play a major role in integrated energy systems like renewable and distributed energy resources power conversion technologies hydrogen storage technologies electric mobility zero and positive energy buildings and local energy communities A one of a kind and holistic treatment of integrated energy systems this book explores power conversion including power to gas power to liquid and power to heat technologies as well as other issues of interest to a broad range of students professionals and academicians involved in energy transition It also covers A thorough introduction to the digitalization of the energy sector and local market development enabling citizen involvement Comprehensive explorations of integrated energy systems as an engine of energy transition Practical discussions of renewable and distributed energy resources for sustainable economic development In depth examinations of the role of hydrogen in a low carbon energy future and the storage technologies of different energy carriers Perfect for electrical construction power and energy engineers Technologies for Integrated Energy Systems and Networks will also earn a place in the libraries of electrochemists and environmental consultants

Advances in Bio-Based Materials for Construction and Energy Efficiency Fernando Pacheco-Torgal, Dan Tsang, 2025-02-26 Advances in Bio Based Materials for Construction and Energy Efficiency fills a gap in the published literature discussing bio based materials and biotechnologies that are crucial for a more sustainable construction industry With comprehensive coverage and contributions from leading experts in the field the book includes sections on bio based materials and biotechnologies for infrastructure applications bio based materials and biotechnologies for building energy efficiency and other applications such as using biotechnology to reduce indoor air pollution for water treatment and in soil decontamination The book will be an essential reference resource for academic researchers civil engineers contractors working in construction works postgraduate students and other professionals Covers recent trends on bio based materials and biotechnologies for eco efficient construction Focus on sustainability and green concepts Includes infrastructure applications building energy efficiency and biotechnology Presents cutting edge technologies that includes the use of nanocellulose geopolymer mortars using agricultural waste and photosynthetic panels made of algae laden biological materials

Sustainable Engineering for Life Tomorrow Jacqueline A. Stagner, David S. K. Ting, 2021-04-21 Sustainable Engineering for Life Tomorrow examines the future of sustainable engineering and architecture The contributors analyses of sustainable solutions such as wind and solar power offer valuable insights for future policy making scholarship and the management of energy intensive facilities

Proceedings of the Canadian Society for Civil Engineering Annual Conference 2023, Volume 4 Serge Desjardins, Gérard J. Poitras, Mazdak Nik-Bakht, 2024-09-17 This book comprises the proceedings of the Annual Conference of the Canadian Society for Civil Engineering 2023 The contents of this volume focus on the specialty track in construction with topics on modular and offsite construction BIM construction planning and project management construction automation AI and robotics in construction

sustainable construction asset management and construction safety among others This volume will prove a valuable resource for researchers and professionals

Rethinking Building Skins Eugenia Gasparri,Arianna Brambilla,Gabriele Lobaccaro,Francesco Goia,Annalisa Andoloro,Alberto Sangiorgio,2021-12-05 *Rethinking Building Skins* Transformative Technologies and Research Trajectories provides a comprehensive collection of the most relevant and forward looking research in the field of facade design and construction today with a focus on both product and process innovation The book brings together the expertise creativity and critical thinking of more than fifty global innovators from both academia and industry to guide the reader in translating research into practice It identifies new opportunities for the construction sector to respond to present challenges towards a more sustainable efficient connected and safe future Introduces the reader to the role of facades with respect to the main challenges ahead Provides an overview of the major facade technological advancements throughout history and identifies prospective research trajectories Includes interviews with key industry players from different backgrounds and expertise Showcases a comprehensive range of leading research topics in the field organised by product and process innovation Covers major innovations across the value chain including facade design fabrication construction operation and maintenance and end of life Contributes towards the definition of an international research agenda and identifies emerging market opportunities for the facade industry

Energy Sustainability Through Green Energy Atul Sharma,Sanjay Kumar Kar,2015-04-21 This book shares the latest developments and advances in materials and processes involved in the energy generation transmission distribution and storage Chapters are written by researchers in the energy and materials field Topics include but are not limited to energy from biomass bio gas and bio fuels solar wind geothermal hydro power wave energy energy transmission distribution and storage energy efficient lighting buildings energy sustainability hydrogen and fuel cells energy policy for new and renewable energy technologies and education for sustainable energy development

Hybrid Aerogels Krunal M. Gangawane,Debabrata Panda,2024-06-04 Aerogels are ultralight porous materials showing great promise in environmental remediation and energy storage Aerogels successfully remove pollutants and can improve the properties of batteries supercapacitors and even flexible electronics The book covers the fundamentals of hybrid aerogels synthesis and their applications It includes computational approaches such as Molecular Dynamics lattice Boltzmann method and Navier Stokes solver

Solar Collectors, Energy Storage, and Materials Francis DeWinter,1990 *Solar Collectors Energy Storage and Materials* covers the materials and basic components needed for solar thermal energy systems Using thermal performance and durability as the major criteria the twenty six chapters emphasize the modeling and assessment of devices rather than their application or cost Each part begins with an overview and concludes with an assessment of current issues and opportunities The contributors have been careful to document failures as well as successes in materials research This is the fifth volume in a series that distills the results of the intensive research on and development of solar thermal energy conversion technologies from 1975 to 1986 Francis de Winter

is President of the Altas Corporation Santa Cruz California and a member of the Santa Cruz Energy Advisory Committee

Contents Solar Collectors Collector Concepts and Designs Optical Theory and Modeling of Solar Collectors Thermal Theory and Modeling of Solar Collectors Testing and Evaluation of Stationary Collectors Testing and Evaluation of Tracking Collectors Optical Research and Development Collector Thermal Research and Development Collector Engineering Research and Development Solar Pond Research and Development Reliability and Durability of Solar Collectors Environmental Degradation of Low Cost Solar Collectors Energy Storage for Solar Systems Storage Concepts and Design Analytical and Numerical Modeling of Thermal Conversion Systems Testing and Evaluation of Thermal Energy Storage Systems Storage Research and Development Materials for Solar Technologies Materials for Solar Collector Concepts and Designs Theory and Modeling of Solar Materials Testing and Evaluation of Solar Materials Exposure Testing and Evaluation of Performance Degradation Solar Materials Research and Development

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