Geopolymers By J L Provis

A geopolymer is a solid aluminosilicate material usually formed by alkali hydroxide or alkali silicate activation of a solid precursor such as coal fly ash, calcined clay and/or metallurgical slag. Today the primary application of geopolymer technology is in the development of reduced-CO2 construction materials as an alternative to Portland-based cements. Geopolymers: structure, processing, properties and industrial applications reviews the latest research on and applications of these highly important materials. Part one discusses the synthesis and characterisation of geopolymers with chapters on topics such as fly ash chemistry and inorganic polymer cements, geopolymer precursor design, nanostructure/microstructure of metakaolin and fly ash geopolymers, and geopolymer synthesis kinetics. Part two reviews the manufacture and properties of geopolymers including accelerated ageing of geopolymers, chemical durability, engineering properties of geopolymer concrete, producing fire and heat-resistant geopolymers, utilisation of mining wastes and thermal properties of geopolymers. Part three covers applications of geopolymers with coverage of topics such as commercialisation of geopolymers for construction, as well as applications in waste management. With its distinguished editors and international team of contributors, Geopolymers: structure, processing, properties and industrial applications is a standard reference for scientists and engineers in industry and the academic sector, including practitioners in the cement and concrete industry as well as those involved in waste reduction and disposal. Discusses the synthesis and characterisation of geopolymers with chapters covering fly ash chemistry and inorganic polymer cements Assesses the application and commercialisation of geopolymers with particular focus on applications in waste management Reviews the latest research on and applications of these highly important materials

Geological Carbon Storage Subsurface Seals and Caprock Integrity Seals and caprocks are an essential component of subsurface hydrogeological systems, guiding the movement and entrapment of hydrocarbon and other fluids. Geological Carbon Storage: Subsurface Seals and Caprock Integrity offers a survey of the wealth of recent scientific work on caprock integrity with a focus on the geological controls of permanent and safe carbon dioxide storage, and the commercial deployment of geological carbon storage. Volume highlights include: Low-permeability rock characterization from the pore scale to the core scale Flow and transport properties of low-permeability rocks Fundamentals of fracture generation, self-healing, and permeability Coupled geochemical, transport and geomechanical processes in caprock Analysis of caprock behavior from natural analogues Geochemical and geophysical monitoring techniques of caprock failure and integrity Potential environmental impacts of carbon dioxide migration on groundwater resources Carbon dioxide leakage mitigation and remediation techniques Geological Carbon Storage: Subsurface Seals and Caprock Integrity is an invaluable resource for geoscientists from academic and research institutions with interests in energy and environment-related problems, as well as professionals in the field.

Contributions from three Focused Sessions that were part of the 34th International Conference on Advanced Ceramics and Composites (ICACC), in Daytona Beach, FL, January 24-29, 2010 are presented in this volume. The broad range of topics is

captured by the Focused Session titles, which are listed as follows: FS1 - Geopolymers and other Inorganic Polymers; FS3 - Computational Design, Modeling Simulation and Characterization of Ceramics and Composites; and FS4 - Nanolaminated Ternary Carbides and Nitrides (MAX Phases). The session on Geopolymers and other Inorganic Polymers continues to attract growing attention from international researchers (USA, Australia, France, Germany, Italy, Czech Republic, and Viet Nam) and it is encouraging to see the variety of established and new applications being found for these novel and potentially useful materials. The session organizer gratefully acknowledges the support of the US Air Force Office of Scientific Research (AFOSR) through Dr. Joan Fuller. The AFOSR has continuously supported these conferences since the first meeting in Nashville, TN in 2003. Focused Session 3 was dedicated to design, modeling, simulation and characterization of ceramics and composites. 27 technical papers were presented on prediction of crystal structure and phase stability, characterization of interfaces and grain boundaries at atomic scale, optimization of electrical, optical and mechanical properties, modeling of defects and related properties, design of materials and components at different length scales, application of novel computational methods for processing. Four of these papers are included in this issue of CESP. Focused Session 4 was dedicated to MAX phases - a class of ternary carbides and nitrides with nanolaminated structure and general formula Mn+1AXn (where M is an early transition metal, A is an A-group element from IIIA to VIA, X is either C or N, and n=1, 2, 3 ...). The MAX phases have attracted recently a lot of attention because they possess unique combination of metallic- and ceramic-like properties. In all, 30 technical papers were presented during this session. Four of these papers are included in this issue.

Advances in Ceramic Matrix Composites, Second Edition, delivers an innovative approach to ceramic matrix composites, focusing on the latest advances and materials developments. As advanced ceramics and composite materials are increasingly utilized as components in batteries, fuel cells, sensors, high-temperature electronics, membranes and high-end biomedical devices, and in seals, valves, implants, and high-temperature and wear components, this book explores the substantial progress in new applications. Users will gain knowledge of the latest advances in CMCs, with an update on the role of ceramics in the fabrication of Solid Oxide Fuel Cells for energy generation, and on natural fiber-reinforced eco-friendly geopolymer and cement composites. The specialized information contained in this book will be highly valuable to researchers and graduate students in ceramic science, engineering and ceramic composites technology, and engineers and scientists in the aerospace, energy, building and construction, biomedical and automotive industries. Provides detailed coverage of parts and processing, properties and applications Includes new developments in the field, such as natural fiber-reinforced composites and the use of CMCs in Solid Oxide Fuel Cells (SOFCs) Presents state-of-the-art research, enabling the reader to understand the latest applications for CMCs Papers from The American Ceramic Society's 31st International Conference on Advanced Ceramics and Composites, held in Daytona Beach, Florida, January 21-26, 2007. Includes papers on porous ceramics ranging from nanoporous to macroporous systems, including foams, honeycombs, 3D scaffolds, interconnected fibers, sintered hollow spheres, and aerogels; ceramics in medical applications; and geopolymers, a new class of totally inorganic, aluminosilicate-based ceramics that are charge balanced

by group I oxides (i.e., Na, K, and Cs)

Collection of selected, peer reviewed papers from the 2014 Malaysia-Indonesia Geopolymer Symposium (MIGS 2014), May 11-12, 2014, Kuala Lumpur, Malaysia. The 57 papers are grouped as follows: Chapter 1: Aggregate, Chapter 2: Geopolymer Technology, Chapter 3: Green Materials, Chapter 4: Coating

This book is a collection of papers from The American Ceramic Society's 35th International Conference on Advanced Ceramics and Composites, held in Daytona Beach, Florida, January 23-28, 2011. This issue includes papers presented in the Thermal Management Materials and Technologies; Advanced Sensor Technology; Geopolymers; and Computational Design, Modeling, and Simulation of Ceramics and Composites symposia.

The book covers the topic of geopolymers, in particular it highlights the relationship between structural differences as a result of variations during the geopolymer synthesis and its physical and chemical properties. In particular, the book describes the optimization of the thermal properties of geopolymers by adding micro-structural modifiers such as fibres and/or fillers into the geopolymer matrix. The range of fibres and fillers used in geopolymers, their impact on the microstructure and thermal properties is described in great detail. The book content will appeal to researchers, scientists, or engineers who are interested in geopolymer science and technology and its industrial applications.

Carbon Dioxide Sequestration in Cementitious Construction Materials provides an updated, state-of-the-art review on the development of cementitious construction materials based on carbon dioxide storage, which will have a major eco-efficient and economic benefit for the construction industry. Key chapters include methods for the assessment of carbon dioxide absorbed by cementitious materials, air and water-based carbon dioxide storage, carbon dioxide storage modeling, carbonation mechanisms, carbon dioxide storage on recycled aggregates, calcium, sodium and magnesium-based binders, properties and the durability of carbon dioxide based concrete. Promotes the importance of CO2 storage in carbonation of these materials, especially reincorporation of CO2 during fabrication Discusses a wide range of cementitious materials with CO2 storage capabilities Features redesign of cementation mechanisms to utilize CO2 during fabrication

This book provides an updated state-of-the-art review on new developments in alkali-activation. The main binder of concrete, Portland cement, represents almost 80% of the total CO2 emissions of concrete which are about 6 to 7% of the Planet’s total CO2 emissions. This is particularly serious in the current context of climate change and it could get even worse because the demand for Portland cement is expected to increase by almost 200% by 2050 from 2010 levels, reaching 6000 million tons/year. Alkali-activated binders represent an alternative to Portland cement having higher durability and a lower CO2 footprint. Reviews the chemistry, mix design, manufacture and properties of alkali-activated cement-based concrete binders Considers performance in adverse environmental conditions. Offers equal emphasis on

the science behind the technology and its use in civil engineering.

The first English-language book which reviews and summarizes worldwide research advances in alkali-activated cements and concrete. Essential topics include: raw materials and their properties for the production of the two new types of binder the hydration and microstructure development of alkali-activated slag cements the mechanical properties and durability of alkali-activated slag cement and concrete other various cementing systems and their applications related standards and specifications. This respected team of authors has produced an important piece of research that will be of great interest to professionals and academics alike, enabling the production of more durable and environmentally sensitive materials.

This volume focuses on research and practical issues linked to Calcined Clays for Sustainable Concrete. The main topics are geology of clays, hydration and performance of blended system with calcined clays, alkali activated binders, applications in concrete and mortar, durability of concrete under various aggressive conditions, and economic and environmental impacts of the use of calcined clays in cement based materials. This book compiles the different contributions of the 2nd International Conference on Calcined Clays for Sustainable Concrete, which took place in La Habana, December 5th-7th, 2017.The papers update the latest research in their field, carried out since the last conference in 2015. Overall it gives a broad view of research on calcined clays and their application in the field of construction, which will stimulate further research into calcined clays for sustainable concrete.

This book focuses on the application of carbon nanotubes and carbon nanofibers in traditional concretes based on Portland cement. Fundamental information is given related to the production technologies of carbon nanotubes and carbon nanofibers, as well as concretes and methods of incorporation. It also contains a section focusing on the possible negative effects of carbon nanotubes and carbon nanofibers on animals and humans. The book indicates benefits and possible problems related to the application of carbon nanotubes and carbon nanofibers in concrete. It is designed to be easy to access and digest for the reader, aiming to reach an audience, not only from academia, but also from the construction industry, materials producers, and contractors who might work with nanomaterials. Outlines the major properties and synthesis methods for carbon nanomaterials in concrete engineering; Explains the role of carbon nanotubes and nanofibers in creating high-performance concrete; Assesses the major challenges of integrating carbon nanomaterials into concrete manufacture on an industrial scale.

Composite materials have been well developed to meet the challenges of high-performing material properties targeting engineering and structural applications. The ability of composite materials to absorb stresses and dissipate strain energy is vastly superior to that of other materials such as polymers and ceramics, and thus they offer engineers many

mechanical, thermal, chemical and damage-tolerance advantages with limited drawbacks such as brittleness. Composite Materials: Manufacturing, Properties and Applications presents a comprehensive review of current status and future directions, latest technologies and innovative work, challenges and opportunities for composite materials. The chapters present latest advances and comprehensive coverage of material types, design, fabrication, modelling, properties and applications from conventional composite materials to advanced composites such as nanocomposites, self-healing and smart composites. The book targets researchers in the field of advanced composite materials and ceramics, students of materials science and engineering at the postgraduate level, as well as material engineers and scientists working in industrial R& D sectors for composite material manufacturing. Comprehensive coverage of material types, design, fabrication, modelling, properties and applications from conventional composite materials to advanced composites such as nanocomposites, self-healing and smart composites Features latest advances in terms of mechanical properties and other material parameters which are essential for designers and engineers in the composite and composite reinforcement manufacturing industry, as well as all those with an academic research interest in the subject Offers a good platform for end users to refer to the latest technologies and topics fitting into specific applications and specific methods to tackle manufacturing or material processing issues in relation to different types of composite materials

Coal Combustion Products (CCPs): Their Nature, Utilization and Beneficiation is a valuable resource for engineers and scientists from the coal, cement, concrete, and construction industries seeking an in-depth guide to the characteristics, utilization, beneficiation, and environmental impacts of coal combustion by-products. Researchers in universities working in this area will also find much to expand their knowledge. The book provides a detailed overview of the different waste materials produced during power generation from coal, exploring their nature, beneficiation techniques, applications, and environmental impacts. Strong focus is placed on coal fly ash, bottom ash, and flue gas desulfurization materials, and their employment in cement, concrete, gypsum products, aggregates, road construction, geotechnics, and agriculture, among other products and industries. Part 1 focuses on the nature of coal ashes, with chapters on their origin, generation, and storage, both in ponds and landfill. The coal combustion by-products produced as a result of clean coal technologies are the focus of the final chapter in the section. The next group of chapters in Part 2 considers the utilization of different waste materials, including the key products coal fly ash, bottom ash, and flue gas desulfurization materials. This is followed by a contribution reviewing the latest research into innovative and advanced uses for coal ash. After an introduction to ash quality problems and quality monitoring, Part 3 concentrates on the essential area of by-product beneficiation techniques, in other words how to maximize the quality of materials for the end user. Topics covered include separation methods, thermal processing, and chemical passivation. The final section of the book addresses

environmental issues, including the use of coal combustion by-products in green construction materials and the essential health and safety considerations associated with their use. An essential reference on the nature, reactivity, beneficiation, potential and environmental risks of coal-combustion by-products Contains an in-depth review of the origin and geochemistry of coal ash Explores the utilization of coal combustion by-products as supplementary cementitious materials to reduce the anthropomorphic greenhouse gas emissions associated with the use of ordinary Portland cement concrete Describes the essential area of the toxicology of coal combustion by-products

This volume focuses on research and practical issues linked to Calcined Clays for Sustainable Concrete. The main subjects are geology of clays, hydration and performance of blended system with calcined clays, alkali activated binders, economic and environmental impacts of the use of calcined clays in cement based materials. Topics addressed in this book include the influence of processing on reactivity of calcined clays, influence of clay mineralogy on reactivity, geology of clay deposits, Portland-calcined clay systems, hydration, durability, performance, Portland-calcined clay-limestone systems, hydration, durability, performance, calcined clay-alkali systems, life cycle analysis, economics and environmental impact of use of calcined clays in cement and concrete and field applications. This book compiles the different contributions of the 1st International Conference on Calcined Clays for Sustainable Concrete, which took place in Lausanne, Switzerland, June, 23-25, 2015.The papers present the latest research in their field. It contains nearly 80 papers and abstracts. Overall, this work gives a broad view of research on calcined clays in the field of construction and will stimulate further research into calcined clays for sustainable concrete.

This issue contains 27 papers from The American Ceramic Society’s 40th International Conference on Advanced Ceramics and Composites, held in Daytona Beach, Florida, January 24-29, 2016. This issue includes papers presented in the following Symposia and Focused Sessions: Symposium 2 – Advanced Ceramic Coatings for Structural, Environmental, and Functional Applications; Symposium 10 – Virtual Materials (Computational) Design and Ceramic Genome; Symposium 11 – Advanced Materials and Innovative Processing Ideas for the Industrial Root Technology; Symposium 12 – Materials for Extreme Environments: Ultrahigh Temperature Ceramics; and Emerging Technologies Symposium–Carbon Nanostructures; and Focused Session 1 - Geopolymers and Chemically Bonded Ceramics.

Lea's Chemistry of Cement and Concrete, Fifth Edition, examines the suitability and durability of different types of cements and concretes, their manufacturing techniques and the role that aggregates and additives play in achieving concrete's full potential of delivering a high-quality, long-lasting, competitive and sustainable product. Provides a 60% revision over the fourth edition last published in 2004 Includes updated chapters that represent the latest technological advances in the industry, including, but not exclusive to the production of low-energy cements, cement admixtures and concrete aggregates Presents expanded coverage of the suitability and durability of materials aggregates and additives

The 3rd International Symposium on Nanotechnology in Construction (NICOM 3) follows the highly successful NICOM 1 (Paisley, UK 2003) and NICOM 2 (Bilbao, Spain 2005) Symposia. The NICOM3 symposium was held in Prague, Czech Republic from May 31 to June 2, 2009 under the auspices of the Czech Technical University in Prague. It was a cross-disciplinary event, bringing together R&D experts and users from different fields all with interest in nanotechnology and construction. The conference was aimed at: Understanding of internal structures of existing construction materials at nano-scale Modification at nano-scale of existing construction materials. Production and properties of nanoparticulate materials, nanotubes and novel polymers. Modeling and simulation of nanostructures. Instrumentation, techniques and metrology at nano-scale. Health and safety issues and environmental impacts related to nanotechnology during research, manufacture and product use. Review of current legislation. Societal and commercial impacts of nanotechnology in construction, their predictions and analysis.

The collection focuses on the advancements of characterization of minerals, metals, and materials and the applications of characterization results on the processing of these materials. Advanced characterization methods, techniques, and new instruments are emphasized. Areas of interest include, but are not limited to:, Novel methods and techniques for characterizing materials across a spectrum of systems and processes., Characterization of mechanical, thermal, electrical, optical, dielectric, magnetic, physical, and other properties of materials., Characterization of structural, morphological, and topographical natures of materials at micro- and nano- scales., Characterization of extraction and processing including process development and analysis., Advances in instrument developments for microstructure analysis and performance evaluation of materials, such as computer tomography (CT), X-ray and neutron diffraction, electron microscopy (SEM, FIB, TEM), and spectroscopy (EDS, WDS, EBSD) techniques., 2D and 3D modelling for materials characterization. The book explores scientific processes to characterize materials using modern technologies, and focuses on the interrelationships and interdependence among processing, structure, properties, and performance of materials. .

This is a State of the Art Report resulting from the work of RILEM Technical Committee 224-AAM in the period 2007-2013. The Report summarises research to date in the area of alkali-activated binders and concretes, with a particular focus on the following areas: binder design and characterisation, durability testing, commercialisation, standardisation, and providing a historical context for this rapidly-growing research field.

This book presents articles from The Australasian Conference on the Mechanics of Structures and Materials (ACMSM25 held in Brisbane, December 2018), celebrating the 50th anniversary of the conference. First held in Sydney in 1967, it is one of the longest running conferences of its kind, taking place every 2–3 years in Australia or New Zealand. Bringing together international experts and leaders to disseminate recent research findings in the fields of structural mechanics, civil engineering and materials, it offers a forum for participants from around the world to review, discuss and present the latest developments in the broad discipline of mechanics and materials in civil engineering.

Proceeding of the 42nd International Conference on Advanced Ceramics and Composites, Ceramic Engineering and Science

Proceedings Volume 39, Issue 3, 2018 Jingyang Wang, Waltraud Kriven, Tobias Fey, Paolo Colombo, William J. Weber, Jake Amoroso, William G. Fahrenholtz, Kiyoshi Shimamura, Michael Halbig, Soshu Kirihara, Yiquan Wu, and Kathleen Shurgart, Editors Valerie Wiesner and Manabu Fukushima, Volume Editors This proceedings contains a collection of 22 papers from The American Ceramic Society's 42nd International Conference on Advanced Ceramics and Composites, held in Daytona Beach, Florida, January 21-26, 2018. This issue includes papers presented in the following symposia: • Advancing Frontiers of Ceramics for Sustainable Societal Development – International Symposium in Honor of Dr. Mrityunjay Singh • Symposium 9: Porous Ceramics: Novel Developments and Applications • Symposium 10: Virtual Materials (Computational) Design and Ceramic Genome • Symposium 12 Materials for Extreme Environments: Ultrahigh Temperature Ceramics (UHTCs) and Nano-laminated Ternary Carbides and Nitrides (MAX Phases) • Symposium 13 Advanced Ceramics and Composites for Nuclear Fission and Fusion Energy • Symposium 14 Crystalline Materials for Electrical, Optical and Medical Applications • Symposium 15 Additive Manufacturing and 3D Printing Technologies • Symposium 16: Geopolymers, Inorganic Polymers and Sustainable Materials • Focused Session 1: Bio-inspired Processing of Advanced Materials • 7th Global Young Investigator Forum

This book presents the applications of ion-exchange materials in the area of environmental analysis and treatment. It includes chapters on applications of organic, inorganic and composite ion exchange materials and hexacyanoferrates in various fields such as chemical and biochemical separations, water purification, removal of harmful impurities, dyes and cationic and anionic complexes. This title is a highly valuable source of knowledge on ion-exchange materials and their applications suitable for postgraduate students and researchers but also to industrial R&D specialists in chemistry, chemical, and biochemical technology. Additionally, this book will provide an in-depth knowledge of ion-exchange column and operations suitable for engineers and industrialists.

The book presents new research in the area of biobased "green composites". Biobased materials involve renewable agricultural and forestry feedstocks, including wood, agricultural waste, grasses and natural plant fibers. These lignocellulosic materials are composed mainly of carbohydrates such as sugar and lignin, cellulose, vegetable oils and proteins. Much research is concerned with renewable materials such as bamboo, vegetable ?bers, soil composites and recycled materials such as rice husk ash and sugar cane ash. The general aim here is to use renewable and non-polluting materials in ways that offer a high degree of sustainability and preserve the remaining natural resources for future generations. Keywords: Biobased Materials, Renewable Materials, Non-polluting Materials, Sustainability, Wood, Agricultural Waste, Grasses, Natural Plant Fibers, Lignocellulosic Materials, Carbohydrates, Sugars, Lignin, Cellulose, Vegetable Oils, Proteins, Bamboo, Vegetable Fibers, Soil Composites, Recycled Materials, Rice Husk Ash, Sugar Cane Ash, Fiber-reinforced Concrete, Post-disaster Reconstruction, Guadua Fibers, Prefabricated Bamboo Guadua Panels, Multi-Level Bamboo Structures, Alkaline Activated Cements, Polymer Residues Reinforced with Glass Fiber, Composites Reinforced with Vegetal Fibers, Sisal Fibers, Bamboo Arch Structure, Adobe Reinforced with Wheat Fibers, Fiber Reinforced Microconcrete, Cements with High Coal Waste Contents, Natural Composites, Geopolymer Concretes.

Aside from water the materials which are used by mankind in highest quantities arecementitious materials and concrete. This book shows

how the quality of the technical product depends on mineral phases and their reactions during the hydration and strengthening process. Additives and admixtures infl uence the course of hydration and the properties. Options of reducing the CO2-production in cementitious materials are presented and numerous examples of unhydrous and hydrous phases and their formation conditions are discussed. This editorial work consists of four parts including cement composition and hydration, Special cement and binder mineral phases, Cementitious and binder materials, and Measurement and properties. Every part contains different contributions and covers a broad range within the area. Contents Part I: Cement composition and hydration Diffraction and crystallography applied to anhydrous cements Diffraction and crystallography applied to hydrating cements Synthesis of highly reactive pure cement phases Thermodynamic modelling of cement hydration: Portland cements – blended cements – calcium sulfoaluminate cements Part II: Special cement and binder mineral phases Role of hydrotalcite-type layered double hydroxides in delayed pozzolanic reactions and their bearing on mortar dating Setting control of CAC by substituted acetic acids and crystal structures of their calcium salts Crystallography and crystal chemistry of AFm phases related to cement chemistry Part III: Cementitious and binder materials Chemistry, design and application of hybrid alkali activated binders Binding materials based on calcium sulphates Magnesia building material (Sorel cement) – from basics to application New CO2-reduced cementitious systems Composition and properties of ternary binders Part IV: Measurement and properties Characterization of microstructural properties of Portland cements by analytical scanning electron microscopy Correlating XRD data with technological properties No cement production without refractories

This volume provides a one-stop resource, compiling current research on developments in strategic materials. It is a collection of papers from The American Ceramic Society s 32nd International Conference on Advanced Ceramics and Composites, January 27-February 1, 2008. Papers included in this issue come from five symposia: "Thermoelectric Materials for Power Conversion;" "Basic Science of Multifunctional Ceramics;" "Science of Ceramic Interfaces;" "Geopolymers;" and "Materials for Solid State Lighting." This is a valuable, up-to-date resource for researchers working in the field.

Geopolymers are applied to material classes that are chemically transformed from low crystallinity aluminusilicates to three-dimensional inorganic polymers (tectosilicates). The resulting material has properties similar to natural minerals, so it is called artificial rock. However, these materials exhibit a chemical composition and mineralogical structure similar to feldspar, feldspathoidal, and zeolites consisting of a polymeric Si–O– Al framework, with a microcrystalline or an amorphous structure. Although geopolymers have attractive engineering and environmental characteristics, there are some challenges in commercializing these materials. In this book, these challenges will be addressed along with introducing the functional geopolymers as an effective approach to commercializing these materials and making them economically feasible.

This proceedings volume for the 4th international conference CIGOS 2017 (Congrès International de Géotechnique - Ouvrages - Structures) presents novel technologies, solutions and research advances, making it an excellent guide in civil engineering for researchers, students, and professional engineers alike. Since 2010, CIGOS has become a vital forum for international scientific exchange on civil engineering. It aims to promote beneficial economic partnerships and technology exchanges between enterprises, worldwide institutions and universities. Following the success of the last three CIGOS conferences (2010, 2013 and 2015), the 4th conference was held at Ho Chi Minh City University of Technology, Ho Chi Minh City (Saigon), Vietnam on 26 to 27 October 2017. The main scientific themes of CIGOS 2017 were focused on ‘New Challenges in Civil Engineering’.

The book outlines recent advances in nuclear wasteform materials including glasses, ceramics and cements and spent nuclear fuel. It focuses on durability aspects and contains data on performance of nuclear wasteforms as well as expected behavior in a disposal environment.

Annual Reports on NMR Spectroscopy provides a thorough and in-depth accounting of the progress made in nuclear magnetic resonance (NMR) spectroscopy and its many applications. Nuclear magnetic resonance (NMR) is an analytical tool used by chemists and physicists to study the structure and dynamics of molecules. In recent years, no other technique has gained as much significance as NMR spectroscopy. It is used in all branches of science in which precise structural determination is required, and in which the nature of interactions and reactions in solution is being studied. This book has established itself as a premier resource for both specialists and non-specialists alike who want to become familiar with the new techniques and applications of NMR spectroscopy. Serves as the premier resource for learning the new techniques and applications of NMR spectroscopy Presents a thorough accounting of the progress made in nuclear magnetic resonance (NMR) spectroscopy and its many applications Provides a key reference for chemists and physicists using NMR spectroscopy to study the structure and dynamics of molecules

Handbook of Low Carbon Concrete brings together the latest breakthroughs in the design, production, and application of low carbon concrete. In this handbook, the editors and contributors have paid extra attention to the emissions generated by coarse aggregates, emissions due to fine aggregates, and emissions due to cement, fly ash, GGBFS, and admixtures. In addition, the book provides expert coverage on emissions due to concrete batching, transport and placement, and emissions generated by typical commercially produced concretes. Includes the tools and methods for reducing the emissions of greenhouse gases Explores technologies, such as carbon capture, storage, and substitute cements Provides essential data that helps determine the unique factors involved in designing large, new green cement plants

Ceramic Engineering and Science Proceedings Volume 34, Issue 10 - Developments in Strategic Materials and Computational Design IV A collection of 25 papers from The American Ceramic Society’s 37th International Conference on Advanced Ceramics and Composites, held in Daytona Beach, Florida, January 27-February 1, 2013. This issue includes papers presented in the Geopolymers and Chemically Bonded Ceramics (Focused Session 1); Thermal Management Materials and Technologies (Focused Sessoin 2); and Materials for Extreme Environments: Ultrahigh Temperature Ceramics and Nano-laminated Ternary Carbides and Nitrides (MAX Phases) (Symposium 12).

This proceedings contains a collection of 24 papers from The American Ceramic Society’s 41st International Conference on Advanced Ceramics and Composites, held in Daytona Beach, Florida, January 22-27, 2017. This issue includes papers presented in the following symposia: • Symposium 3 14th International Symposium on Solid Oxide Fuel Cells (SOFC) • Symposium 8 11th International Symposium on Advanced Processing & Manufacturing Technologies for Structural & Multifunctional Materials and Systems • Symposium 11 Advanced Materials and Innovative Processing ideas for the Production Root Technology • Symposium 12 Materials for Extreme Environments: Ultrahigh Temperature

Ceramics (UHTCs) and Nano-laminated Ternary Carbides and Nitrides (MAX Phases) • Symposium 13 Advanced Materials for Sustainable Nuclear Fission and Fusion Energy • Symposium 14 Crystalline Materials for Electrical, Optical and Medical Applications • Symposium 15 Additive Manufacturing and 3D Printing Technologies • Focused Session 1 Geopolymers, Chemically Bonded Ceramics, Eco-friendly and Sustainable Materials

This book covers relevant synthesizing parameters, their interactions, and advantages of blending fly ash and blast furnace slag as source material, their relationship with mechanical properties and microstructure including guidelines to produce an optimal mix proportion. Further, it discusses related durability aspects, mechanical properties and reaction products and their inter-relationship. It explains phase characterization with XRD/SEM, change in the bond formulations with FTIR, FESEM and EDAX analysis. A mix design guideline based on empirical statistical concept has been put forward for professionals to manufacture customized activated fly ash composites in presence of slag. Aimed at graduate/senior undergraduate students, researchers in civil engineering, construction engineering, ceramics, material sciences, this book: Covers mechanical and microstructural properties, curing, durability of blended Alkali- activated composites with fly ash and blast furnace slag. Proposes a guideline for mix design on chemical compositions of ingredients, relationship of synthesizing parameters, workability, target strength. Describes sustainable green material manufacturing methodologies. Discusses issues like microstructural properties and reaction mechanism. Explores related modern experimental techniques like XRD, FTIR, MIP and so forth.

This book investigates geopolymers and geopolymer-based composites, with a focus on their preparation, geopolymerization mechanisms, microstructures, mechanical properties, and fracture behaviors. Geopolymers are inorganic materials consisting of tetrahedral units (such as [SiO4] and [AlO4]) linked by shared oxygens and forming long-range, covalently bonded and amorphous frameworks. Geopolymers have the advantages of low-temperature preparation, low cost, high heat and corrosion resistance, and being environmentally friendly. Using the preparation methods for epoxy-based composite, they can easily be formed into complex shapes or structures. Intended for researchers investigating geopolymers and their matrix composite materials, this book is also a valuable resource for engineers from various fields, such as materials, mechanical, civil and structural engineering, as well as students interested in other kinds of inorganic materials or even cementitious materials in general.