IMPACT FACTOR 3.004

CITESCORE 4.7 SCOPUS

energies

an Open Access Journal by MDPI

Section

C: Energy and Environment

energies

an Open Access Journal by MDPI

IMPACT FACTOR 3.004

CITESCORE 4.7 SCOPUS

Section Editor-in-Chief
Prof. Dr. Antonio Zuorro
Department of Chemical Engineering, Materials and Environment, Sapienza - University of Rome, Via Eudossiana 18, 00184 Rome, Italy

About the section *C: Energy and Environment*

The "Energy and Environment" Section covers all topics at the interface of energy and the environment that are of interest to the science and engineering communities. Special focus is given to progress in research and applications associated with the development and evaluation of technological and administrative pathways that minimize the environmental impacts of energy life cycles.

Scope:
Example topic areas within the scope of our journal's "Energy and Environment" Section are listed below. This list is neither exhaustive nor exclusive:

- Advanced Technologies for Environmentally Friendly Energy Systems
- Environmental Impacts of Energy Production
- Environmental Sustainability Assessments
- Sustainability of Renewable Energies
- Water-Energy-Environment Nexus

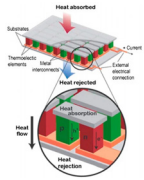
Section C: Energy and Environment

Content Highlights

DOI:10.3390/en13143606

A Review on Thermoelectric Generators: Progress and Applications

Authors: Mohamed Amine Zoui, Saïd Bentouba, John G. Stocholm and Mahmoud Bourouis

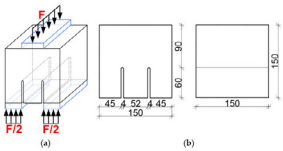


Abstract: A thermoelectric effect is a physical phenomenon consisting of the direct conversion of heat into electrical energy (Seebeck effect) or inversely from electrical current into heat (Peltier effect) without moving mechanical parts. The low efficiency of thermoelectric devices has limited their applications to certain areas, such as refrigeration, heat recovery, power generation and renewable energy. However, for specific applications like space probes, laboratory equipment and medical applications, where cost and efficiency are not as important as availability, reliability and predictability, thermoelectricity offers noteworthy potential. The challenge of making thermoelectricity a future leader in waste heat recovery and renewable energy is intensified by the integration of nanotechnology. In this review, state-of-the-art thermoelectric generators, applications and recent progress are reported. Fundamental knowledge of the thermoelectric effect, basic laws, and parameters affecting the efficiency of conventional and new thermoelectric materials are discussed. The applications of thermoelectricity are grouped into three main domains. The first group deals with the use of heat emitted from a radioisotope to supply electricity to various devices. In this group, space exploration was the only application for which thermoelectricity was successful. In the second group, a natural heat source could prove useful for producing electricity, but as thermoelectricity is still at an initial phase because of low conversion efficiency, applications are still at laboratory level. The third group is progressing at a high speed, mainly because the investigations are funded by governments and/or car manufacturers, with the final aim of reducing vehicle fuel consumption and ultimately mitigating the effect of greenhouse gas emissions.

DOI:10.3390/en14030668

The Beneficial Effect of the Addition of Fly Ash on Reduction of the Size of Microcracks in the ITZ of Concrete Composites under Dynamic Loading

Author: Grzegorz Ludwik Golewski

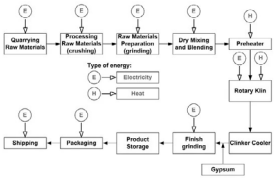


Abstract: The paper presents results of tests on the effect of the addition of fly ash (FA) in the amounts of 0%, 20%, and 30% by weight of cement on the interfacial microcracks in concrete composites subjected to dynamic loads. The analyses were carried out based on the results of the microstructural tests using a scanning electron microscope (SEM). The average width of the microcracks (W_c) in the interfacial transition zone (ITZ) of coarse aggregate with cement matrix was evaluated. During the studies beneficial effect of the addition of FA on reduction of the size of Wc in the ITZ of concrete composites under dynamic loading were observed. Based on obtained test results, it was found that using the 20% FA additive causes favorable changes in the microstructure of mature concrete. In this composite, the average value of Wc was lower by more than 40% compared to the result obtained for the reference concrete. In contrast, concrete containing 30% FA additive had greater microcracks in the ITZ area by over 60% compared to the material without additive. In all analyzed composites, an increase in the Wc value by almost 70% to over 110% in the case of occurrence of dynamic loads was also observed. This was the most evident in the case of concrete with a higher content of FA.

DOI:10.3390/en13092184

Energy Savings Associated with the Use of Fly Ash and Nanoadditives in the Cement Composition

Author: Grzegorz Ludwik Golewski



Abstract: The paper presented herein investigates the effects of using supplementary cementitious materials (SCMs) in quaternary mixtures on the compressive strength and splitting tensile strength of plain concrete. In addition, environmental benefits resulting from the proposed solutions were analysed. A total of four concrete mixtures were designed, having a constant water/bi nder ratio of 0.4 and total binder content of 352 kg/m^3. The control mixture only contained ordinary Portland cement (OPC) as binder, whereas others incorporated quaternary mixtures of: OPC, fly ash (FA), silica fume (SF), and nanosilica (nS). Based on the obtained test results, it was found that concretes made on quaternary binders containing nanoadditives have very favorable mechanical parameters. The quaternary concrete containing: 80% OPC, 5% FA, 10% SF, and 5% nS have shown the best results in terms of good compressive strength and splitting tensile strength, whereas the worst mechanical parameters were characterized by concrete with more content of FA additive in the concrete mix, i.e., 15%. Moreover, the results of compressive strength and splitting tensile strength are qualitatively convergent. Furthermore, reducing the amount of OPC in the composition of the concrete mix in quaternary concretes causes environmental benefits associated with the reduction of: raw materials that are required for burning clinker, electricity, and heat energy in the production of cement.

DOI:10.3390/en13153761

Operational Parameters of Biogas Plants: A Review and Evaluation Study

Authors: Abdullah Nsair, Senem Onen Cinar, Ayah Alassali, Hani Abu Qdais and Kerstin Kuchta

Abstract: The biogas production technology has improved over the last years for the aim of reducing the costs of the process, increasing the biogas yields, and minimizing the greenhouse gas emissions. To obtain a stable and efficient biogas production, there are several design considerations and operational parameters to be taken into account. Besides, adapting the process to unanticipated conditions can be achieved by adequate monitoring of various operational parameters. This paper reviews the research that has been conducted over the last years. This review paper summarizes the developments in biogas design and operation, while highlighting the main factors that affect the efficiency of the anaerobic digestion process. The study's outcomes revealed that the optimum operational values of the main parameters may vary from one biogas plant to another. Additionally, the negative conditions that should be avoided while operating a biogas plant were identified.

Special Issues Open for Submission

Energy and Exergy Analysis of Renewable Energy Conversion Systems
Guest Editor: Dr. Audrius Bagdanavicius
Deadline: **10 April 2022**

Energy Transition and Environmental Sustainability
Guest Editors: Prof. Dr. Prafula Pearce and Prof. Dr. Tina Soliman Hunter
Deadline: **20 April 2022**

Optimizing Renewable-Energy-Driven Systems Using Thermodynamic, Economic, and Environmental Analyses
Guest Editor: Dr. Siamak Hoseinzadeh
Deadline: **30 May 2022**

Renewable Energy and Energy Storage Systems
Guest Editors: Prof. Dr. Abdul-Ghani Olabi, Prof. Ing. Michele Dassisti and Dr. Zhien Zhang
Deadline: **31 May 2022**

Sustainable Production and Environmentally Responsible Consumption
Guest Editor: Prof. Dr. Dimitrios A. Georgakellos
Deadline: **15 June 2022**

Turbomachinery, Energy and Environmental Technologies
Guest Editor: Prof. Dr. Chirag Trivedi
Deadline: **30 June 2022**

Smart Energy for Smart Cities
Guest Editors: Prof. Dr. Ewa Łaźniewska and Prof. Dr. Jarogniew Rykowski
Deadline: **20 July 2022**

Application of Remote Sensing in Renewable Energy and Environment
Guest Editor: Dr. Gustavo Ovando
Deadline: **30 July 2022**

Assessment and Analysis of Waste Treatment and Environmental Management
Guest Editors: Dr. Robert Oleniacz and Prof. Katarzyna Grzesik
Deadline: **31 August 2022**

CO_2 Emissions from Vehicles
Guest Editors: Prof. Dr. Kazimierz Lejda, Dr. Artur Jaworski and Dr. Maksymilian Mądziel
Deadline: **31 December 2022**

MDPI is a member of

Affiliated Societies

Follow Us

facebook.com/MDPIOpenAccessPublishing

twitter.com/MDPIOpenAccess

linkedin.com/company/mdpi

weibo.com/mdpicn

Wechat: MDPI-China

blog.mdpi.com

www.mdpi.com **mdpi.com/journal/energies**

See www.mdpi.com for a full list of offices and contact information. MDPI is a company registered in Basel, Switzerland, No. CH-270.3.014.334-3, whose registered office is at St. Alban-Anlage 66, CH-4052 Basel, Switzerland.

Basel, February 2022