Hindawi
Advances in Materials Science and Engineering
Volume 2022, Article ID 9797342, 2 pages
https://doi.org/10.1155/2022/9797342

*Editorial*

# Sustainable Building Materials and Technologies 2020

**Nadezda Stevulova**,[1] **Kestutys Baltakys**,[2] **Adriana Estokova**,[1] **Vojtech Vaclavik**,[3] **and Sanja Dimter**[4]

[1]*Technical University of Kosice, Kosice, Slovakia*
[2]*Kaunas University of Technology, Kaunas, Lithuania*
[3]*VSB-Technical University of Ostrava, Ostrava, Czech Republic*
[4]*Josip Juraj Strossmayer University of Osijek, Osijek, Croatia*

Correspondence should be addressed to Nadezda Stevulova; nadezda.stevulova@tuke.sk

Received 5 January 2022; Accepted 5 January 2022; Published 25 January 2022



Construction material production has a great impact on the depletion of natural resources and greenhouse gas emissions caused by fossil fuel combustion, thus affecting global climate change and ozone depletion. On the other hand, building materials are largely determining the energy consumption in buildings and having environmental impacts. The goal for sustainable future in building material production is development of new environmentally friendly materials and constructions for sustainable buildings securing long-term environmental, economic, and social viability.

Therefore, the main aim of this Special Issue was to provide a platform for publishing the latest knowledge about application of sustainability as one of the most important topics in development of sustainable building materials and technologies. Although call for papers included a wide range of potential topics, the Special Issue *Sustainable Building Materials and Technologies 2020* contains only 7 papers addressed to advances in application of supplementary cementitious materials as alternative binder components in concrete. The utilization of industrial waste, by-products, and vegetal fibres incorporated into cement mortar/concrete for hydration process, strength development, and durability improvement of high performance concrete is analysed in detail in some papers bringing innovative integrated solutions to key building materials.

The authors W. J. Cho et al. summarize recent research results about the potential utilization of ferronickel slag (FNS) as a supplementary cementitious material. The investigation of the effects of FNS use on mortar and concrete properties showed that replacement of cement by FNS resulted in the increase in setting times and workability by delaying the hydration process, in the formation of a more dense pore structure compared with cement mix, in an increase in compressive strength at the long-term curing ages, and in improvement of resistance to chloride penetration and sulfate attack due to the secondary hydration reactions creating C-S-H gel and hydrotalcite.

The behavior of calcined magnesium-based mineral powder as a potential alternative resource for the production of magnesium-based binder was investigated by G. Sugila Devi and K. Sudalaimani. Paste made of powdered thermally treated (1200°C) mineral mixture consisting of natural magnesite and steatite in a ratio of 3 : 1 with water and with and without addition of sodium tripolyphosphate salt was tested for its microscopic structural development, consistency, initial setting time, final setting time, and heat of hydration. As shown in the results, adding phosphate salt led to formation of hydration products such as magnesium hydroxide and struvite and to an increase in setting time and compressive strength.

The utilization of four waste materials such as fly ash, circulating fluidized bed combustion ash, and slag as mineral admixtures in different amounts (up to 30 wt.%) and 9 wt.% addition of silica fume into high-performance concrete (HPC) and their influence on the mechanical properties and durability of HPC were evaluated by Z. Cheng et al. Variation of mineral admixtures in concrete samples led to the achievement of compressive strength values higher than 60 MPa after 28 days of hardening depending on the waste kind. Among all three admixtures, HPC with circulating fluidized bed combustion ash had the best frost resistance.

The effects of replacing fine aggregates with different contents of coal bottom ash (up to 100%) on the strength properties of high-strength concrete (>60 MPa) at curing ages of 28 and 56 days were investigated by In-H. Yang et al. The samples reached the level of high-strength concrete, and coal bottom ash could be utilized for fabrication of high-strength concrete as a partial or total substitution for fine aggregates. Equations for predicting the strength values of coal bottom ash concrete by using the ultrasonic pulse velocity were suggested.

H. Danso investigated the influence of incorporation of plantain pseudostem fibre (up to 1 wt.% of sand) and 10 wt.% cement replacement by lime on the physical and mechanical properties of cement mortars. An optimal fibre content of 0.25 wt.% is recommended for construction application.

E. Abu Zeiton with co-authors focused on the parameters affecting the properties of the generated hemihydrate and dihydrate after the 1st reaction cycle of hydration-dehydration process. Their major finding consisted of revealing the differences in the properties such as the particle size, specific surface area, surface morphology, and number of defects between the formed hemihydrate after the first hydration-dehydration compared to the unrecycled hemihydrate. The grinding process after the first hydration step and the calcination process responsible for increasing the number of defects on the crystal surface led to a change in setting time, microstructure, and compressive strength of the recycled hemihydrate.

T. Tofeti Lima and K. Yong Ann paid attention to recovering the concrete structures under chloride-induced corrosion by an efficient nondestructive treatment by three different electrolytes (tap water, calcium hydroxide, and lithium borate) applied temporarily to structures. Lithium borate was identified as the most efficient electrolyte for extracting chlorides, while calcium hydroxide had better performance on restoring the passive state after corrosion, healing the structure at another level, filling up possible cracks. The positive affect was also found due to a possible electrodeposition of the electrolyte ions on the cement matrix.

## Conflicts of Interest

The Guest Editors declare that they have no conflicts of interest regarding the publication of this Special Issue.

*Nadezda Stevulova*
*Kestutys Baltakys*
*Adriana Estokova*
*Vojtech Vaclavik*
*Sanja Dimter*