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Editorial

Advanced Building Materials for Passive House and Energy Storage

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Buildings are responsible for more than 40 percent of global energy use and one-third of global greenhouse gas emissions, both in developed and developing countries (UNEP, 2009). Therefore building sector has the largest potential to reduce the significant greenhouse gas emissions. Nowadays passive house and nearly zero-energy building have been a hot issue for the sustainable building design and construction (Jurgen Schnieders, 2006). To do this, it is necessary to reduce the energy requirement during construction and operation periods. To reduce the energy consumption in buildings without discomfort, advanced building materials, including high-performance concrete, insulation materials, wood-based materials, thermal energy storage, high-insulated windows, and air-tight wall constructions, should be developed and applied to the building components (Feist, 2005). And thermal energy storage systems (i.e., phase change materials (PCM)) can be used to reduce energy consumption of buildings. It means that the application of PCM in buildings not only saves energy but also decreases the temperature fluctuation. By utilizing these technologies, it is also much easier to achieve that the architect and engineers can reduce energy demand in buildings. By stimulating energy efficiency in existing and new buildings, significant reductions in energy demand can be achieved in passive house and zero-energy buildings. During the wide propagation of the advanced building technologies, governmental subsidies can be more attractive to individual construction projects and the effective way to promote at a large scale (Audenaert, 2008).

This special issue aims to publish high quality research articles and review articles addressing recent advances on advanced building materials for saving energy. During the past few months, we reviewed 14 research papers submitted by international distinguished scholars. During the intensive blind-peer-review process and in-depth discussions, 5 articles were accepted for the publication, even if the other papers were rejected mainly due to the discrepancy in scope of this special issue. Accepted papers were ended up with a useful review and edit process to improve the quality of paper. The related topics of accepted papers include the soil in the Loess Plateau region as one of traditional building materials, an efficient steel beam structure for modular construction, foam concrete materials with good thermal insulation performance, the biomechanical system in an industrial manufacturing process, and the reinforced self-compacted engineered cementitious composite beams. Some article analyzed the compressive behavior of raw soil and modified soil specimens through experiments and proposed the generalized stress-strain equations for the widespread application. Some article investigated the structural behavior of large-scale reinforced self-compacted engineered cementitious composite beams via theoretical models. Some article dealt with a systematic design approach for the development of an efficient steel beam section for modular construction based on Six-Sigma. And some article proposed a biomechanical system for the emulation of the movement of human arm, leg, and spine movements, as an industry alternative to manage heavy operations in a manufacturing process.

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