Advances in Civil Engineering

Hindawi

Special Issue on

New and Advanced Materials and Technologies in Ultralow-Energy Buildings

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The building sector is one of the largest contributors to energy consumption worldwide, representing 32% of the total energy consumption in the world and accounting for 60% of the world's electricity. Thus, there have been significant efforts to reduce energy consumption in buildings. The ultralow-energy building is one successful approach to reducing carbon emissions in the building sector with growing interest worldwide. The principle of the ultralow-energy building emphasizes passive building design and the high performance heating, ventilating, and air-conditioning (HVAC) system. Typical features include superinsulation, airtightness envelopes, daylighting, high-performance windows, energy efficient HVAC, and electrical lighting, which impose significant technical challenges. For example, a low heat transfer coefficient of passive building design, typically in the 0.10 to 0.15 W/(m^2K) range, requires new and advanced materials for insulation. The realization of zero energy buildings has sparked innovations in HVAC systems by applying new materials and technologies. New materials and technologies are indispensable for high performance windows because they require both a low thermal transmittance and a high total solar transmittance.

Therefore, the development of new and advanced materials and technologies is a prerequisite to the wide spread of the ultralow-energy buildings. Also, the unique indoor environment of the ultralow-energy building has large implications for occupant comfort and energy performance simulation and modelling. The main aim of this special issue is to provide a platform for wide range professions to understand and discuss the major challenges and recent advancements in materials and technologies in the ultralow-energy building. This special issue welcomes original research articles as well as review articles.

Potential topics include but are not limited to the following:

- New and advanced materials and technologies for the ultralow-energy building
- Integration of new materials and technologies into the ultralow-energy building
- Composites and materials for superinsulation and high performance windows
- New challenges in high performance windows and HVAC systems
- Advances in materials and technologies in daylighting and electrical lighting
- Energy and environmental performances of the ultralow-energy building
- Recent achievements in the design and performance evaluation of the ultralow-energy building
- New findings on occupant comforts and energy performance modelling

Authors can submit their manuscripts through the Manuscript Tracking System at https://mts.hindawi.com/submit/journals/ace/namt/.

Papers are published upon acceptance, regardless of the Special Issue publication date.

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