Special Issue

Development and Validation of Phase Change Materials for Energy Storage

Message from the Guest Editors

Phase change materials (PCMs) are widely recognised as energy storage materials that minimize the mismatch between energy supply and demand and can be applied to general energy conservation methods. However, commercially available PCMs have inherently low thermal conductivity, limiting their thermal effectiveness, despite attempts to improve this aspect. Additionally, PCMs are limited by fixed phase transition temperatures and chemical stability over long periods, thus restricting their effectiveness and adaptability across diverse climates. The integration of PCMs could also substantially raise product costs, accounting for 30-40% of the final price, which hinders widespread adoption. These highlighted barriers have prompted numerous studies focused on the development and application of novel phase change materials. Topics of interest include, but are not limited to the following:

- Theoretical modelling;
- Optimal design and integration of phase change materials;
- Life cycle analysis;
- Nanoencapsulation of PCMs;
- Heat transfer enhancement;
- 3D printing of PCMs;
- Molecular dynamic simulation;
- Multiphase change materials;
- AI-enabled fabrication.

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Deadline for manuscript submissions

25 June 2026

Energies

an Open Access Journal by MDPI

Impact Factor 3.2
CiteScore 7.3

mdpi.com/si/231600

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Energies is an international, open access journal in energy engineering and research. The journal publishes original papers, review articles, technical notes, and letters. Authors are encouraged to submit manuscripts which bridge the gaps between research, development and implementation. The journal provides a forum for information on research, innovation, and demonstration in the areas of energy conversion and conservation, the optimal use of energy resources, optimization of energy processes, mitigation of environmental pollutants, and sustainable energy systems.

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