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Editorial: Materials, process, and applications in energy storage systems

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Editorial on the Research Topic
Materials, process, and applications in energy storage system

The intensification of global warming has forced countries around the world to make plans to reduce carbon emissions. As an energy-consuming country, China has also set the goal of carbon reduction to achieve its carbon peak by 2030 and carbon neutrality by 2060. Improving the energy efficiency of traditional fossil fuels (e.g., waste heat recovery and utilization) and increasing the deployment of renewable energy sources, such as solar energy and wind energy, are widely considered as two important approaches to achieve the goal of carbon neutrality. However, the uncontrollable fluctuation nature of waste heat and renewable energy will lead to a mismatch between power supply and energy demand, which will greatly restrict the large-scale application of such energy sources. Energy storage technology can be used as an energy buffer to solve these issues effectively. As the core part of energy storage technology, energy storage materials directly determine charging and discharging performance, energy storage capacity, service, and environmental impact, *etc.* Moreover, the thermal performance of an energy storage system can also be affected by heat transfer enhancement, the structure of energy storage devices, and operation optimization.

This Research Topic contains the four of the latest research in the area of energy storage materials, heat transfer enhancement, and the optimization of structural and operational parameters. A summary of the contribution of this research is presented as follows. For materials, Li et al. prepared two kinds of LiBr solutions, one added with dispersant (E414) and the other added with dispersant (E414) and nano-CuO. The effects of temperature, LiBr concentration, dispersant amount, and volume fraction of nanoparticles on the viscosity of the LiBr solution were further investigated. For heat transfer enhancement, Ebrahimnataj et al. proposed to adopt T-shaped fins with a novel layout for improving the melting of phase change materials (PCMs) in a triple-tube heat storage system . The effect of the fins' dimension on the melting process of PCMs was analyzed numerically to the determine the optimum case. Shojaeinasab Chatroudi et al. used spaced circular fins to improve the heat transfer performance of PCMs in a double-tube latent heat storage unit. The influence of the presence of fins in the free convection and melting process of molten PCMs was comprehensively studied, and then the optimum geometrical characteristics of the fins (e.g., arrangement, size, and number) were determined. For optimization of the structural and operational parameters, Zhang et al. numerically investigated the effects of structural operational parameters on the vertical cooling process by establishing the 2-D steady-state mathematical model of the porous media. The optimized operating and structural parameters were finally obtained with the objective of the maximum income energy of the gas.

There are many good works that could not be collected in this Research Topic due to the limit of time. We look forward to continuing to follow Frontiers in Energy Research, especially with a focus on the aspect of energy storage technology.

Author contributions

FJ is the first author, YX is the corresponding author, and all others are contributors. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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