

2nd International Conference on **Smart Materials & Structures**

February 29-March 02, 2016 Philadelphia, Pennsylvania, USA

The experimental exploration of sodium chloride solution on thermal behaviour of phase change materials

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Solar energy, as an inexhaustible and green natural resource, has attracted researches' attention for its promising future in industry. However, the applications of such energy are limited due to time and space constraints. Phase change materials (PCMs) are the effective substances for thermal energy storage. Nowadays, storing solar energy in the form of latent heat by using phase change materials (PCMs) is found to be one of the latest and the most efficient energy storage technologies. Compared to other energy storage methods, one striking feature of PCMs is the high energy storage density.

Unfortunately, various problems such as high supercooling degree, low crystal growth rate and poor thermal conductivity greatly hinder the large-scale utilization of PCMs. The present investigation focuses on improving the crystallization and decreasing supercooling degree by adding various proportions of NaCl/NaCl solutions into the n-octadecane-based PCMs for thermal energy storage. The experimental results show that 20 wt. % NaCl solutions have the greatest effect on the thermal performance of PCMs. The supercooling degree has been minimized up to 6°C with the addition of NaCl. It can not only promote crystallization under 1 wt. % addition rate, but also enhance latent heat storage performance. Such observations have been verified by the kinetics of crystallization. The researches on supercooling could advance the applications of PCMs on various fields including solar energy, heat recovery, battery thermal management, green building and etc.

Biography

Guolin Song is an associate professor of materials science, Advanced Materials Institute of Graduate School at Shenzhen, Tsinghua University, where he teaches courses in functional polymer materials and materials science frontier. He obtained his Ph.D. degree from Colour and Chemistry Department at University of Leeds, UK in 2006. He also carried out a 2-year postdoctoral research work in Tsinghua University, China. His recent research interests focus on phase change materials, biomass and bio-degradable polymer composites, nano-materials and nano-technology, and etc. He has published more than 40 scientific papers (mostly are SCI indexed) and obtained 6 Chinese patents.

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