World Academy of Science, Engineering and Technology
International Journal of Pharmacological and Pharmaceutical Sciences
Vol:12, No:03, 2018

High Power Thermal Energy Storage for Industrial Applications Using Phase Change Material Slurry

Authors : Anastasia Stamatiou, Markus Odermatt, Dominic Leemann, Ludger J. Fischer, Joerg Worlitschek

Abstract : The successful integration of thermal energy storage in industrial processes is expected to play an important role in the energy turnaround. Latent heat storage technologies can offer more compact thermal storage at a constant temperature level, in comparison to conventional, sensible thermal storage technologies. The focus of this study is the development of latent heat storage solutions based on the Phase Change Slurry (PCS) concept. Such systems promise higher energy densities both as refrigerants and as storage media while presenting better heat transfer characteristics than conventional latent heat storage technologies. This technology is expected to deliver high thermal power and high-temperature stability which makes it ideal for storage of process heat. An evaluation of important batch processes in industrial applications set the focus on materials with a melting point in the range of 55 - 90 °C. Aluminium ammonium sulfate dodecahydrate ($NH_4Al(SO_4)_2{\cdot}12H_2O$) was chosen as the first interesting PCM for the next steps of this study. The ability of this material to produce slurries at the relevant temperatures was demonstrated in a continuous mode in a laboratory test-rig. Critical operational and design parameters were identified.

Keywords : esters, latent heat storage, phase change materials, thermal properties
Conference Title : ICP 2018 : International Conference on Pharmacology
Conference Location : Madrid, Spain
Conference Dates : March 26-27, 2018