

Performance of Flat Plate Loop Heat Pipe for Thermal Management of Lithium-Ion Battery in Electric Vehicle Application

Authors : Bambang Ariantara, Nandy Putra, Rangga Aji Pamungkas

Abstract : The development of electric vehicle batteries has resulted in very high energy density lithium-ion batteries. However, this progress is accompanied by the risk of thermal runaway, which can result in serious accidents. Heat pipes are heat exchangers that are suitable to be applied in electric vehicle battery thermal management for their lightweight, compact size and do not require external power supply. This paper aims to examine experimentally a flat plate loop heat pipe (FPLHP) performance as a heat exchanger in the thermal management system of the lithium-ion battery for electric vehicle application. The heat generation of the battery was simulated using a cartridge heater. Stainless steel screen mesh was used as the capillary wick. Distilled water, alcohol and acetone were used as working fluids with a filling ratio of 60%. It was found that acetone gives the best performance that produces the thermal resistance of 0.22 W/°C with 50 °C evaporator temperature at heat flux load of 1.61 W/cm².

Keywords : electric vehicle, flat-plate loop heat pipe, lithium-ion battery, thermal management system

Conference Title : ICHTA 2015 : International Conference on Heat Transfer and Applications

Conference Location : Osaka, Japan

Conference Dates : October 08-09, 2015