TECHNOLOGY

Capillary Fed Evaporator

OVERVIEW

Most currently available evaporators are using boiling as the mechanism to remove heat from a surface by a working fluid. But this results in pressures that affect the efficiency of energy conversion processes, sometimes quite significantly. One such process is in Ocean Thermal Energy Conversion (OTEC), where the thermal cycle utilizes about 20°C temperature difference between the hot and cold energy reservoirs. In this case, 5°C loss in the evaporator may translate into as much as 25% lost cycle energy.

Evaporation into open volume, thermodynamically, is a far more effective heat transfer mechanism, particularly when compared to boiling, when thin film evaporation is used. Liquid evaporates from the surface at saturation temperature and thin liquid film imposes very low thermal resistance to supply energy to the evaporation fluid. However, organization and maintaining of thin film evaporation is difficult.

Researchers at the University of Maryland have designed a cell and tube evaporator with a micro structured surface positioned substantially vertically with the major transport capability of this surface horizontal or close to it so that the liquid pressure towards the micro structured surface is substantially constant, providing uniform liquid distribution. This allows the realization of the most efficient thin film evaporation in the heat exchangers. Reduced temperature difference in the evaporative process improves thermal efficiency of thermodynamic cycles of thermal engines and cooling machines.

Applications:
· Air conditioning and refrigeration evaporators
· Ocean Thermal Energy Conversion systems
Advantages:
· Particularly beneficial in machinery working with low temperature difference between energy source and sink.
· Significant improvement to cell and tube evaporators

CONTACT INFO

UM Ventures
0134 Lee Building
7809 Regents Drive
College Park, MD 20742
Email: umdtechtransfer@umd.edu
Phone: (301) 405-3947 | Fax: (301) 314-9502

Additional Information

INSTITUTION

University of Maryland, College Park

PATENT STATUS

Patent(s) pending

LICENSE STATUS

Contact OTC for licensing information

CATEGORIES

- Industrial Processing

EXTERNAL RESOURCES

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