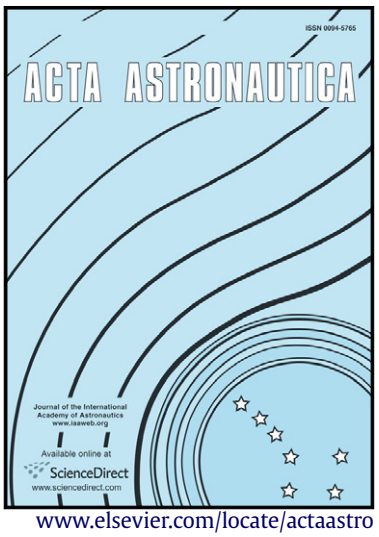

www.elsevier.com/locate/actaastro

Composite structures with gradient of permeability to be used in heat pipes under microgravity

A.G. Kostornov, A.L. Moroz, A.A. Shapoval, O. Kabov, P. Strizhak, J.C. Legros

PII: S0094-5765(15)00178-2
DOI: http://dx.doi.org/10.1016/j.actaastro.2015.04.022
Reference: AA5424

To appear in: *Acta Astronautica*

Received date: 29 March 2015
Revised date: 26 April 2015
Accepted date: 28 April 2015

Cite this article as: A.G. Kostornov, A.L. Moroz, A.A. Shapoval, O. Kabov, P. Strizhak, J.C. Legros, Composite structures with gradient of permeability to be used in heat pipes under microgravity, *Acta Astronautica,* http://dx.doi.org/10.1016/j.actaastro.2015.04.022

COMPOSITE STRUCTURES WITH GRADIENT OF PERMEABILITY TO BE USED IN HEAT PIPES UNDER MICROGRAVITY.

A.G. Kostornov [(1)], A.L. Moroz[(1)], A.A. Shapoval[(1)], O. Kabov[(2,3)], P. Strizhak[(3)], J.C. Legros[(3,4)]

(1) Frantsevith Institute for Problems of Material Sciences Ukrainian NAS, Kiev
(2) Institute of Thermophysics , RAS, Novosibirsk, Russia
(3)National Research Tomsk Polytechnic University, Tomsk, Russia
(4) Euro Heat Pipes Inc., Nivelles, Belgium

Corresponding author J.C. Legros:
Tel.:+3226506570, Fax: +3226503126
Email: jclegros@ulb.ac.be

Abstract

We report results of a detailed experimental study on capillary properties of new composite structures produced by simultaneous sintering of fibers and particles**.** This study suggests a way to meet the contradictory requirements to produce efficient evaporator to be used e.g. in capillary pump loops (CPL). In CPL, a porous evaporator is responsible of the displacement of the working liquid absorbing heat by its vaporization and releasing this heat at a remote condenser. The permeability of the porous evaporator of an efficient capillary pump must be as large as possible, but simultaneously this pump has to produce the largest capillary pressure at level of vapor/liquid interface in pores of very small diameters. We investigated new sintered composite capillary structures; such materials have the possibility to take advantage of both fibers and powder. It was found when forming highly porous plane samples that different macrostructures can appear depending on the ratio of fibers and powder dimensions, and also of the thicknesses of the different layers. This is opening the road to the use of different macrostructures; the possibility to