IX Minsk International Seminar "Heat Pipes, Heat Pumps, Refrigerators, Power Sources",
Minsk, Belarus, 07-10 September, 2015

DEVELOPMENT OF MULTILAYER POROUS MEDIA USING COLLOIDAL PROCESSING

S. T. R. Velásquez[1], G. G. V. Nuernberg[1], J. P. M. Florez[1], L. E. Vieira[2], M. B. H. Mantelli[1], A. N. Klein[2]

[1] Heat Pipe Laboratory (LABTUCAL)
Federal University of Santa Catarina
Mechanical Engineering Department
88040-900, Trindade, Florianópolis, SC, Brazil
(+55) (48) 3721-9937

[2] Material Laboratory (LABMAT)
Federal University of Santa Catarina
Mechanical Engineering Department
88040-900, Trindade, Florianópolis, SC, Brazil

Abstract

This work describes the development of copper oxide multilayered porous media with 30 vol% of charcoal, used as space holder material, which was milled during different time periods, 5 – 45 minutes. A previews work developed with different space holder concentration showed that 30 vol% presents the best properties of mechanical resistance and porosity for the desired application and that each concentration presents a different percentage of retraction. In the present work, to be able to develop multilayer porous media, the concentration was maintained constant and the charcoal particle size was modified. The rheological behavior of the mixture was studied through constant rate curves. The ceramic bodies were produced in different layer combinations through aqueous colloidal processing, using slip casting as molding technique. The each layer final bodies were heat treated and characterized to obtain its porosity, pore size distribution, permeability and effective thermal conductivity. The sintered samples presented porosity of $60.2 \pm 2{,}0$ %, bimodal pore size distribution, permeability $10^{-14}-10^{-13}$ $1/m^2$ (depending of the space holder average particle size) and effective thermal conductivity of 5,6 W/(m·K). The multilayer porous media interface was characterized through scanning electron microscope images.