ANALYSIS AND OPTIMIZATION OF ELECTROFORMED DENDRITIC STRUCTURES AS ENHANCED HEAT TRANSFER SURFACES

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ABSTRACT

Over the past several years, the use of passive cooling devices in electronics such as heat pipes and vapor chambers has increased. Due to their more widespread use, these technologies have a high demand for more adaptable manufacturing and increased efficiency. The choice in wicking structure in these devices has been limited to trading efficiency for manufacturability or vice versa. Using an electroforming process, a new wicking structure has been designed which can optimize the balance between these two extremes. This new process forms a wick which can be grown on virtually any metal surface and on almost any geometry. In addition, the effective thermal conductivity, capillary pumping power, and permeability of this wick can be controlled during its manufacture by varying the electroforming process's parameters. By changing the acidity, salt content, and current density of the electroforming bath, a wick can be generated to meet the requirement of high heat flux applications.