

**The Feasibility and Design of High Pressure Wick Evaporators
for Vapor-Compression Cycles**

Dr. Boris V. Kosoy
Professor of the Engineering Thermodynamics Department
Odessa State Academy of Refrigeration
1/3 Dvoryanskaya St. 65026 Odessa Ukraine
tel/ fax (380) –482 –619-925
E-mail: bkosoy@yahoo.com

(The present research relate to both Section 3 and Section 4 topics.)

Recent progress in micro electrical mechanical systems and nanotechnology make it possible to consider a possibility of application of submicron wick structures as the construction elements of refrigeration machines. Current study analyses thermodynamic feasibility of high-pressure wick evaporator.

Conventional two-phase loop systems (for example, refrigeration heat pipes) provide potentially compact thermal transport solutions with the high efficiency and isothermal characteristics of liquid-vapor phase change. On the other hand, passive circulation of the working fluid in refrigeration cycles with non-mechanical compression is not new. Application of high-porosity permeable structures with median surface pore diameters in the order of a few nanometers allows to construct capillary pumps across which can be maintained both large pressure (>1 MPa) and large temperature (> 100 K) differentials. These capillary pumps represent high performance wick evaporators.

Present research consider thermodynamic fundamentals of micro vapor-compression refrigerators with respect to physical and technological constrains and design availability, and identify the perspective direction for further research.