[0100] Ramaswamy et al. (2002) report experimental results for average heat flux versus wall superheat in microchannels with engineered features in the walls to enhance boiling which range from about 4 W/cm^2 at a wall superheat of 4.5° C. to about 19 W/cm^2 at a wall superheat of 13° C. with hydraulic diameter varying between 0.134 mm and 0.287 mm. Finally, Honda and Wei (2004) have measured average heat flux for a given wall superheat for engineered wall surfaces. **FIG. 4** shows the combined effects of fin thickness and fin height on the boiling curve of micropin-finned chip. The boiling curves of various other chip designs (Chip S, Oktay and Schmekenbecher, O'Connor et al., and Anderson and Mudawar) are also shown for comparison. In **FIG. 4**, Chip PFa-h (a=30 and 50, h=60-270) denotes the micropin-finned chip with in-line array of a micron thick and h micron high square pin fins. The fin spacing is the same as the fin thickness.

REFERENCES

[0101] Ammermann, C. N. and S. M. You, 2001, "Enhancing Small-Channel Convective Boiling Performance Using a Microporous Surface Coating,"*Journal of Heat Transfer* 123(5), 976-983.

[0102] Brutin, D., F. Topin, and L. Tadrist, 2003, "Experimental study of unsteady convective boiling in heated minichannels,"*International Journal of Heat and Mass Transfer* 46, 2957-2965.

[0103] Chedester, R. C. and S. M. Ghiaasiaan, 2002, "A proposed mechanism for hydrodynamically-controlled onset of significant void in microtubes,"*International Journal of Heat and Fluid Flow* 23, 769-775.

[0104] Ghiaasiaan, S. M. and R. C. Chedester, (2002), "Boiling incipience in icrochannels,"*International Journal of Heat and Mass Transfer* 45, 4599-4606.

[0105] Honda, H and J. J. Wei, 2004, "Enhanced boiling heat transfer from electronic components by use of surface microstructures," Experimental Thermal and Fluid Science 28, 159-169.

[0106] Hsu, Y. Y., and Graham, R. W., 1961, "An Analytical and Experimental Study of the Thermal Boundary Layer and Ebullition Cycle in Nucleate Boiling," NASA TN-D-594.

[0107] Kandlikar, S. G., 2002, "Fundamental issues related to flow boiling in minichannels and microchannels,"*Experimental Thermal and Fluid Science* 26 (2002) 389-407.

[0108] Kandlikar, S. G., 2004, "Heat Transfer Mechanisms During Flow Boiling in Microchannels,"*Transactions of the ASME*, Vol 126, February 2004.

[0109] Lockhart, R. W. and Martinelli, R. C., "Proposed Correlation of Data for Isothermal Two-Phase, Two-Component Flow in Pipes", *Chemical Engineering Progress* 45(1), pp. 39-48, 1949.

[0110] Lee, M., Y. Y. Wong, M. Wong, and Y. Zohar, 2003, "Size and shape effects on two-phase flow patterns in microchannel forced convection boiling,"*Journal OF Micromechanics and Microengineering* 13, 155-164.

[0111] Lee, P. C., F. G. Tseng, and Chin Pan, 2004, "Bubble dynamics in microchannels. Part I: single microchannel,"*International Journal of Heat and Mass Transfer* 47, 5575-5589

[0112] Peng, X. F., H. Y. Hu, and B. X. Wang, 1998, "Boiling Nucleation during liquid flow in microchannels, "*International Journal of Heat and Mass Transfer* 41 (1), 101-106.

[0113] Pettersen, J., 2004, "Flow vaporization of CO2 in microchannel tubes,"*Experimental Thermal and Fluid Science* 28, 111-121.

[0114] Ramaswamy, C., Y. Joshi, W. Nakayama, and W. B. Johnson, 2002, "High-speed visualization of boiling from an enhanced structure,"*International Journal of Heat and Mass Transfer* 45, 4761-4771.

[0115] Sato, T., and Matsumura, H., 1964, "On the Conditions of Incipient Subcooled Boiling with Forced Convection," Bull. JSME, 7(26), pp. 392-398.

[0116] Thome, J. R., 2004, "Boiling in microchannels: a review of experiment and theory," International *Journal of Heat and Fluid Flow* 25, 128-139.

[0117] Warrier, G. R., V. K. Dhir, and L. A. Momoda, 2002, "Heat transfer and pressure drop in narrow rectangular channels,"*Experimental Thermal and Fluid Science* 26, 53-64.

[0118] Wu, H. Y. and P. Cheng, 2003, "An experimental study of convective heat transfer in silicon microchannels with different surface conditions,"*International Journal of Heat and Mass Transfer* 46, 2547-2556.

[0119] Wu, H. Y. and P. Cheng, 2004, "Boiling instability in parallel silicon microchannels at different heat flux, "*International Journal of Heat and Mass Transfer* 47, 3631-3641.

[0120] High flux boiling in low flow rate, low pressure drop mini-channel and micro-channel heat sinks", Bowers et al., International Journal of Heat and Mass Transfer; January 1994; v. 37, No. 2, p. 321-332. (12 pages)

[0121] "Forced convection boiling in a microchannel heat sink", Jiang et al., Journal of Microelectromechanical Systems; March 2001; v. 10, No. 1, p. 80-87. (8 pages)

[0122] "Forced convection and flow boiling heat transfer for liquid flowing through microchannels", Peng et al., International Journal of Heat and Mass Transfer; September 1993; v. 36, No. 14, pp. 3421-2427. (7 pages)

[0123] Anderson et al.; Microelectronic Cooling by Enhanced Pool Boiling of a Dielectric Fluorocarbon Liquid; 1988

[0124] Fujii et al.; Nucleate Pool Boiling Heat Transfer from MicroPorous Heating Surface; 1983.

[0125] Park et al.; Effects of Size of Simulated Microelectronic Chips on Boiling & Critical Heat Flux; 1986.

[0126] U.S. Patent Application Publication No.: U.S. 2004/0182551 A1, Boiling Temperature design in Pumped Microchannel Cooling Loops, Sep. 23, 2004.

[0127] U.S. Patent Application Publication No.: U.S. 2004/0104012 A1, Boiling Vapor Escape Microchannel Heat Exchanger, Jun. 3, 2004.

[0128] U.S. Patent Application Publication No.: U.S. 2004/0082804 A1, Boiling Multiphasic Microchannel Reactions, Apr. 29, 2004.