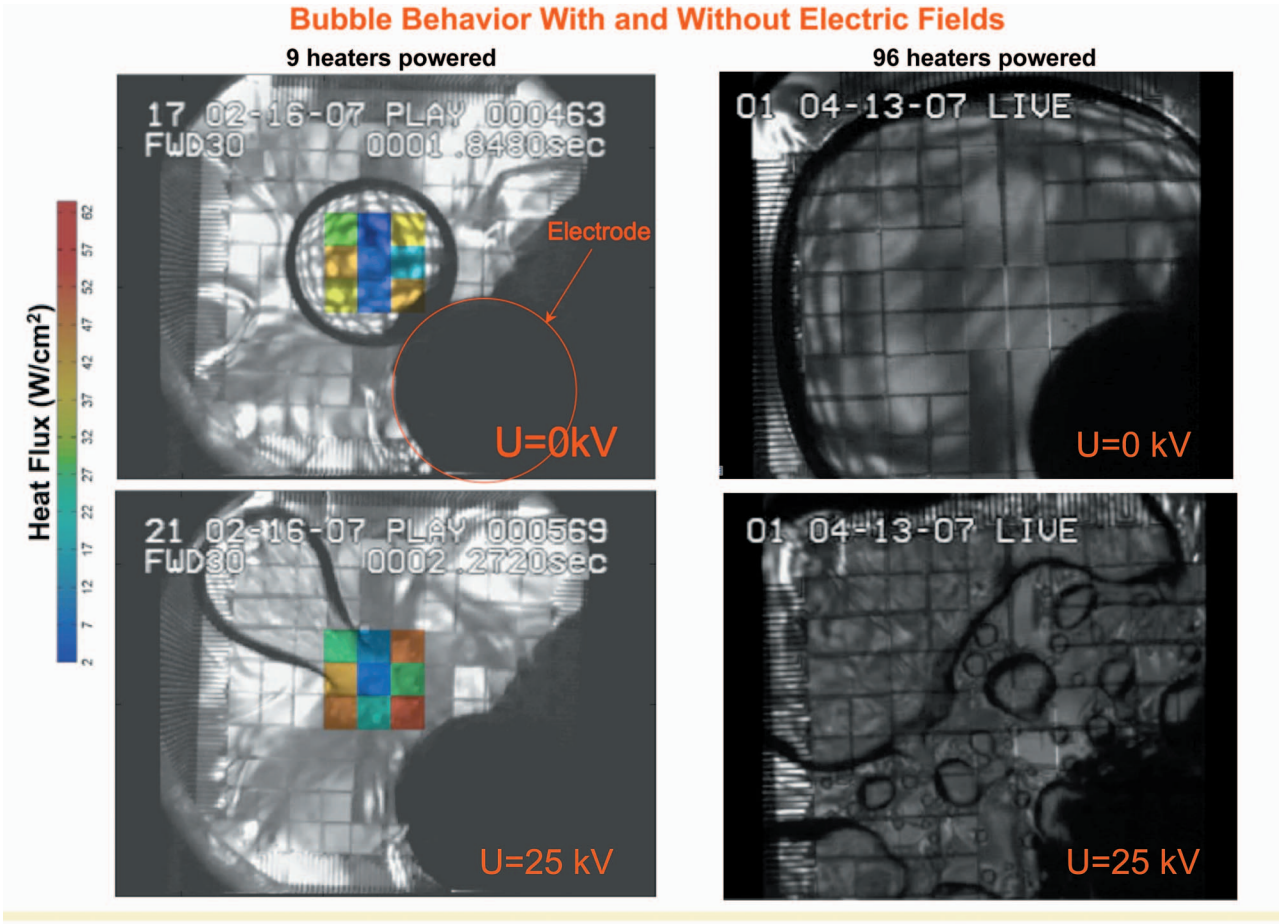

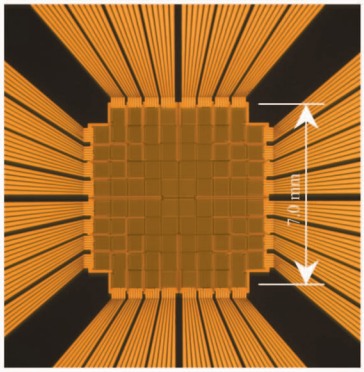

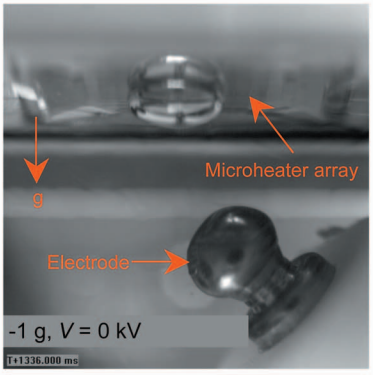

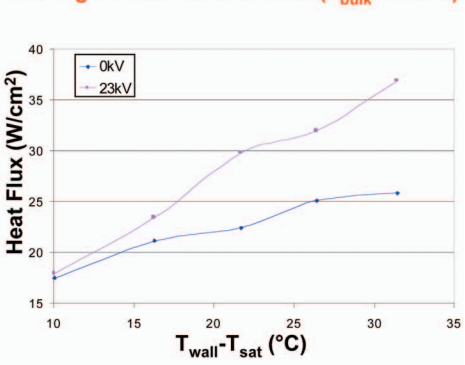

Pool boiling on a downward facing microheater array under the influence of electric fields

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The effects of a nonuniform electric field on vapor bubble detachment and heat transfer rate were studied in pool boiling at different subcooled conditions for various wall temperatures. A dielectric fluid (FC-72) was used as the working fluid at ambient pressure. An array of 3x3 independently controlled microheaters, each 0.7x0.7mm² in size, was maintained at constant temperature using electronic feedback loops, enabling the heat transfer from each heater to be determined. An electric field was applied between the horizontal, downward facing microheater array, which was grounded, and a spherical, off-axis top electrode. Boiling heat transfer results with and without the electric field are presented. Without the electric field, a single large ''primary'' bubble was observed to form due to the coalescence of the individual "satellite" bubbles which nucleated directly from each single heater array. Vapor completely covered the heater due to this primary bubble resulting in a very low heat transfer. With the electric field applied, the primary bubble departed periodcally, enabling new bubbles to grow and transfer much larger amounts of heat. Due to the nonuniformity of the electric field, bubbles moved away from the top electrode (into the region of weaker electric field) during their development.

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