



These images show bubble nucleation and growth of a thin film heater (a platinum film 15 μm wide, 30 μm long and 0.2 μm thick) that is heated by an 11.8 volt pulse of 0.50 μs duration in subcooled water. Imaging is by illumination from a Nd:Yag laser (hence the green colored photographs) that produces an effective frame rate of 1.3×10^8 frames/s (the method is described in Avedisian et al. (2006) and Balss et al. (2005)). Time is relative to the first appearance of bubbles. In the early phase, bubbles are visible at the four corners of the platinum surface (58 ns) which grow laterally into a vapor film (142 ns) that covers the surface by 178 ns after which the bubble thickens and grows into the bulk (246 ns and beyond). The collapse phase (e.g., 3.5 μs to 3.8 μs) continues well after the heater pulse is turned off. Vapor completely disappears (3.65 μs) but then bubbles reappear (3.8 μs) well after the power-off phase. Reappearance of bubbles is speculated to be the result of a stagnation-like flow induced by the rapid collapse and inward motion of liquid that jets upward to cause a local reduction of pressure to cavitate a bubble at 3.8 μs .

Nanosecond Imaging of Bubble Nucleation on a Microheater

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