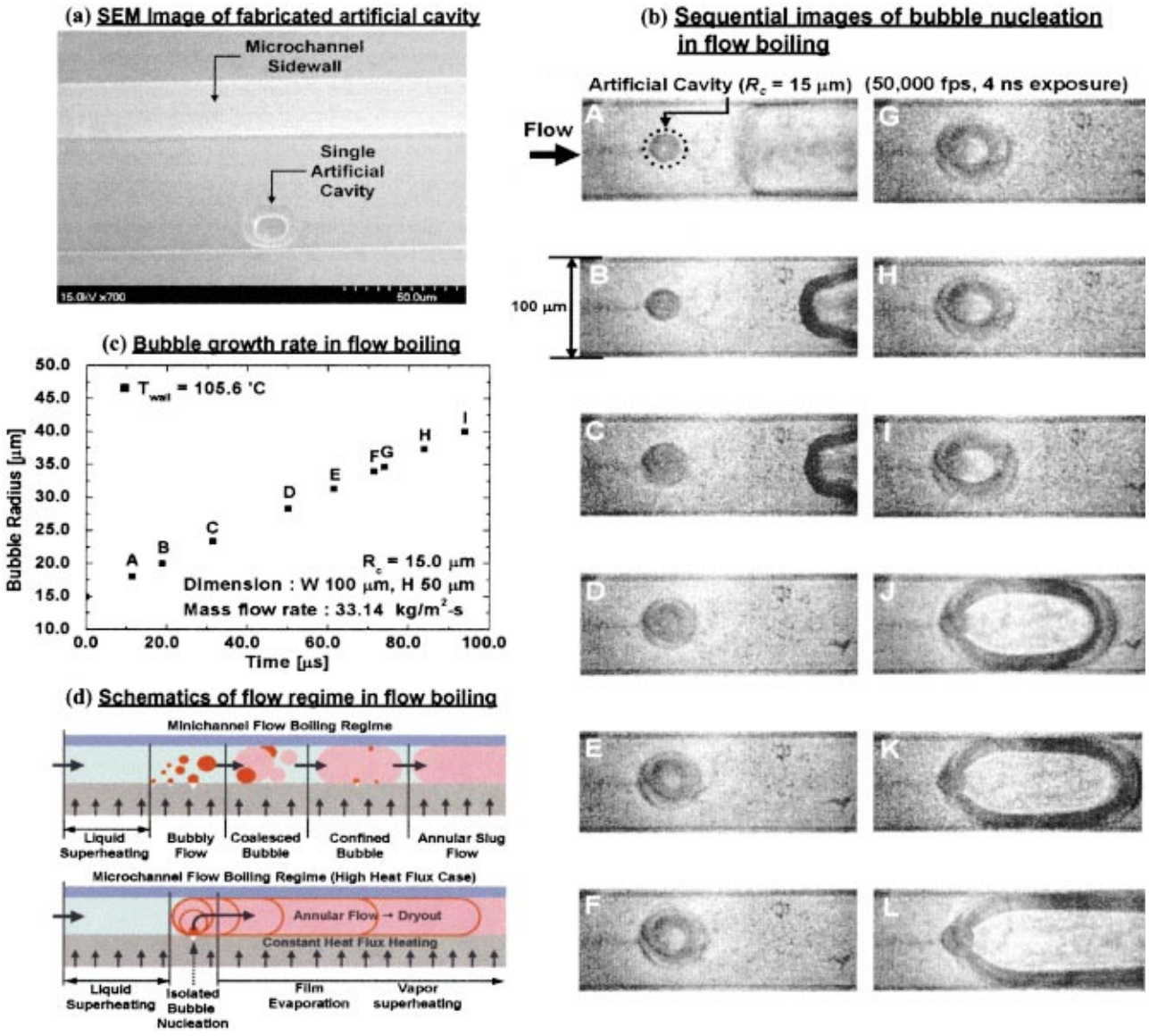

Microscale bubble nucleation from an artificial cavity in single microchannel

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Bubble nucleation of flow boiling from a single artificial cavity has been visualized in a microchannel. Visualization uses 4ns pulse light at 532nm wavelength from two resonance Nd:YAG lasers for the illumination. And in order to take two sequential images, a progressive scan digital CCD camera with straddling technique at 50,000 frame per second. An integrated MEMS device is fabricated for the investigation. The device is composed with a single microchannel (D_h = 67μm), a single artificial cavity (Radius of Cavity (R_c) = 15μm) (**a**), visualization window, Pt-line heater for constant heat flux condition, and Pt-RTD temperature sensors on both sides. The visualized sequential images (**b**) are applied to map the bubble growth (**c**). The map (**c**) shows that the bubble growth rate is quite linear ((**b**), A-I) until the bubble forms as an annular flow ((**b**), K and L). A single bubble from a cavity explosively grows and fills whole downstream of channel without coalescence and confinement with other bubbles ((**b**), K and L). (**d**) schematically shows the difference in the flow regime development between meso- and micro-scale flow boiling.