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Microbubble Evolution due to Acoustic Droplet Vaporization: Observation via Ultra-High Speed Imaging[1] ZHENG ZHENG WONG, OLIVER KRIPFGANS, J. BRIAN FOWLKES, JOSEPH BULL, University of Michigan — A potential therapy for cancer, gas embolotherapy, is being researched. It involves selective, acoustic vaporization of liquid PFC droplets (encapsulated by albumin shells) into gas bubbles that can lodge in the nearby vasculature to achieve occlusion of blood flow and "starvation" of the tumor. The shape evolution of microbubbles due to acoustic droplet vaporization in a 120-micron flow tube at room temperature was imaged via a 8-channel, 16-frames ultra-high-speed camera, at rates of several million frames per second. Initial droplet size ranges from 0.05 to 0.95 times tube diameter D. The bubbles followed an elliptical evolution more closely than a circular evolution. Depending on the initial droplet size, bubbles of two- to six-fold diameters were produced within a few microseconds. Growth-collapse cycles were observed in cases where the albumin shell was broken completely. For large droplets, internal phase change events could be observed. When small droplets were lined up in close proximity, coalescence was achieved for dual as well as multiple droplets. The experimental results show general consensus with a computational model by Ye & Bull (2004) and a detailed comparison would be worthwhile.

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