Abstract Submitted
for the DFD09 Meeting of
The American Physical Society

Acoustic Droplet Vaporization through PDMS DAVID LI, STANLEY SAMUEL, J. BRIAN FOWLKES, JOSEPH BULL, The University of Michigan — Acoustic droplet vaporization (ADV) involves the generation of bubbles from albumin-encapsulated perfluorocarbon (PFC) droplets that have been insonated with high intensity ultrasound (US). Gas embolotherapy, utilizing ADV, may facilitate occlusion of blood flow in the vasculature as bubbles undergo volume expansion of up to 125 times. Cancer therapy could benefit from such occlusions through starvation of the tumor. In order to visualize the detailed mechanics of vaporization and expansion process of the PFC droplets, idealized microvessels were constructed using polydimethylsiloxane (PDMS) channels. Microchannels (20 micron diameter) were fabricated using PDMS with polymer-crosslinker mixing ratios ranging from 5:1 to 20:1. Droplets were introduced into the channels and exposed to US for vaporization. Mixing ratios were observed to impact the impedance matching at the water-PDMS interface, which affected the threshold for ADV. The threshold was lowest for mixing ratios of 5:1 and 20:1, and greatest for 9:1. Final bubble volumes were compared with a computational model by Ye & Bull and were found to be consistent. This work is supported by NIH grant R01EB006476.

Joseph Bull
The University of Michigan

Date submitted: 01 Aug 2009 Electronic form version 1.4