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Microfluidic Production of Monodisperse Perfluorocarbon Microdroplets DAVID LI, KEVIN SCHALTE, J. BRIAN FOWLKES, JOSEPH BULL, University of Michigan — Acoustic droplet vaporization (ADV) is process in which liquid perfluorocarbon (PFC) microdroplets are vaporized using focused ultrasound to form gas bubbles that are approximately 125 times larger in volume. Gas embolotherapy is a novel cancer treatment that uses ADV in vivo to strategically form gas emboli, which can lodge in the microcirculation and starve tumors. Current methods to produce PFC microdroplets, such as high speed shaking or sonication, result in polydisperse droplet distributions where a fraction of droplets fall within the 2-10 microns range. In the clinical application with such a droplet distribution, large droplets are filtered by the lungs and small droplets result in bubbles that are too small to lodge in the tumor vasculature. Consequently, there is a need for a monodisperse droplet distribution. A microfluidic based device has been developed in order to produce such monodisperse PFC microdroplets. The device used hydrodynamic flow focusing to create droplets with a mean diameter less than 10 microns in diameter. This work is supported by NIH grant R01EB006476.

Joseph Bull
University of Michigan

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