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Particle shedding from coated magnetic microbubbles CHON U. CHAN, School of Physical and Mathematical Science, Nanyang Technological University, YU GAO, CHENJIE XU, School of Chemical and Biomedical Engineering, Nanyang Technological University, MANISH ARORA, CLAUS-DIETER OHL, School of Physical and Mathematical Science, Nanyang Technological University — Nanoparticle-coated microbubbles have found applications for diagnostic imaging as well as drug delivery, yet the release of shell material due to ultrasonic excitation has not been studied in detail. We find that particles are ejected from the shell if the bubbles are driven resonantly with ultrasound. The bubble oscillation and the release of the particles are observed with high-speed photography while floating in microfluidic channels. The nanoparticles are shed when the bubble wall acceleration exceeds a threshold. When bubbles are excited into shape oscillations the particle shedding is observed at the velocity antinodes of the bubble surface. Particle release and transport is modelled with a force balance, considering inertia of the particle, the oscillatory fluid flow created by bubble oscillation, and the viscous force acting on the particle. We also demonstrate the ability to control the location of microbubbles in liquid using a diverging magnetic field and an optical feed-back loop. Then the magnetic microbubbles can be stabilized and translated in a three dimensional bubble trap.

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