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Acoustic-assisted fluidic hourglasses TAMARA GUIMARAES, Virginia Tech, ALVARO MARIN, University of Twente, CHRISTIAN J. KAEHLER, RUNE BARNKOB, Bundeswehr University Munich — Microfluidic devices are prone to get clogged when suspensions are forced through narrow passages. Such clogging events occur when particles form arches that block the channel. In this work we study the clogging probabilities in a microfluidic hourglass when subject to ultrasound. We measure the clogging probabilities for certain ranges of sound amplitudes and particle-to-neck size ratios in which clogging events are more likely to occur. The ultrasound induces acoustic radiation forces on the suspended particles, leading to particle migration perpendicular to the channel flow direction. The transverse particle rearrangement can significantly reduce the clogging probability by decreasing the chances of arching in the narrowing of the passage. We show that by choosing proper sound actuation conditions, the method is reliable, non-intrusive, preventive, and allows to increase the life of fluidic devices (microfluidic or larger) with particles in a wide range of sizes.

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