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**Investigations on a novel photoacoustofluidic effect**[1] GABRIEL DUMY, MAURICIO HOYOS, JEAN-LUC AIDER, Physique et Mcanique des Milieux Htrognes ESPCI Paris — Acoustic manipulation of micro-objects (particles, cells, bacteria) can be achieved using ultrasonic standing waves in a fluidic or microfluidic resonator. By matching resonator dimensions and acoustic field frequency it is possible to use acoustic radiation force (ARF) to gather the particles in the pressure nodal (or anti-nodal) plane, creating one or several aggregates. In standard operating conditions, they are stable for as long as needed in acoustic levitation at this position. In this study, we present a new unexpected phenomenon. After creating an aggregate of light-absorbing particles, we show that it is possible to force the breakup of the aggregate when lighting it with an electromagnetic wave of adequate wavelength and intensity. While the particles remain in levitation, they are rejected and propelled away from the aggregate, leading to its destruction. We show that this phenomenon depends on both amplitude of the ultrasonic field and lighting intensity. Various experiments with different types of particles and concentrations are used to discuss the possible phenomenon explanations. Moreover, investigations showed that this phenomenon applies to biological compounds such as red blood cells and stem cells, suggesting potential biomedical applications.

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