Microchip acoustofluidics enables novel bioanalytical applications and commercial opportunities

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Acoustic standing wave technology applied to microfluidic systems has opened new avenues for non-contact processing of microparticles, cells and sub micrometer sized vesicles. Acoustophoresis is a fundamental mode of operation where microparticles and cells can be precisely translated across fluid streams, in an acoustic standing wave field, based on their intrinsic acoustophysical properties (density, size and compressibility). This opens routes to the development of lab-on-a-chip systems for e.g. cell separation, concentration, buffer exchange etc. The acoustic standing wave force is however strongly dependent on the particle size and in practice particles sizes smaller than 1-2 micrometer becomes cumbersome to manipulate solely by the primary acoustic radiation force. More recent developments has however demonstrated acoustofluidic modalities where a combination of the primary acoustic radiation force and secondary acoustic forces are combined to reach into the submicrometer domain where applications that encompass e.g. rapid bacteria analysis, nanoparticle enrichment and extra cellular microvesicle signalling can be targeted. Examples of these basic developments and efforts to bring this technology into commercial settings through Acousort AB will be given.

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