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The Lab-on-a-Disc: Miniature Counterpart to the Lab-on-a-CD for Driving Chip-Based Microcentrifugation LESLIE YEO, NICK GLASS, RICHARD SHILTON, PEGGY CHAN, JAMES FRIEND, Micro/Nanophysics Research Laboratory, RMIT University — The Lab-on-a-CD concept has opened up the powerful possibility of carrying out a range of microfluidic operations simply by using a compact disc (CD) player to spin a disc on which microchannels are fabricated. Nevertheless, the bulk rotation of the entire CD structure is cumbersome, expensive and unreliable - the antithesis of microfluidic philosophy. Fluid transfer on and off the chip can also be difficult. We have instead developed a miniaturized centrifugal microfluidic platform for lab-on-a-chip applications that employs surface acoustic waves to drive the rotation of a 10 mm SU-8 disc on which microfluidic structures are patterned. Unlike its macroscopic Lab-on-a-CD counterpart, the Lab-on-a-Disc does not require moving parts, and is inexpensive, disposable, and significantly smaller both in terms of the disc itself and the portable palmtop battery-operated circuit used to power the chip-sized device. In the first proof of concept, we show the capability of the Lab-on-a-Disc platform to drive capillary-based valving, mixing and size-based concentration/separation of aqueous particle suspensions in microchannels on the disc. To the best of our knowledge, the miniature Lab-on-a-Disc concept is the first microcentrifugation platform small enough to comprise a handheld device.

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