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Special Issue

Acoustofluidics in Medicine and Biology

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Message from the Guest Editors

The development of many acoustofluidic devices has focussed on medical or biological applications, largely because acoustofluidic techniques are well-suited for handling cell sized bodies, from micron-sized bacteria to larger mammalian cells. In addition, acoustic traps can work effectively at energy densities that are compatible with cell survival, the acoustic fields are relatively robust to different cell media, and traps can work over large distances. The majority of reported acoustofluidic cell-manipulation applications are in flow-through devices for sample preparation, detection and diagnosis, with obvious relevance for microfluidic point-of-care approaches. There is also an interest in using traps for static holding of cells and for bringing cells together in a controlled way for applications, such as toxicology testing, drug discovery, tissue engineering, and the study of cell–cell interactions. The acoustic field can mechanically stimulate biological cells to deliver bioactive compounds, to elicit a biological response, or to investigate ultrasound–cell interaction mechanisms.

There remain significant challenges to wider uptake of the technology however, including increasing throughput in flow-through devices, improving device reliability, system integration, refining the stability of trapped cells, and understanding the response of di erent cell types to the acoustofluidic environment. This Special Issue will comprise original research articles, reviews and short communications that describe recent advances in the field, to include new biomedical applications, addressing of fundamental biological and physical issues, and improving device and system design and implementation.

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