

**Ultrasonic Devices for Biomedical Applications: A Developing Career**

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The integration of ultrasonic arrays into devices and packages tailored to emerging applications is crucial to their adoption and commercial success. In this talk, approaches to developing devices for ultrasonic manipulation and for high resolution ultrasound imaging are discussed, with the design and fabrication driven by the unmet needs in clinical procedures and life sciences research. For biosciences research, ultrasonic manipulation using transducer arrays has arisen out of a need to dexterously move particles and cells within fluidic systems, a technique complementary to the optical tweezing that is in common use. Systems for realising concepts such as "Sonic Screw-drivers" and "Tractor Beams" are demonstrated, and arrays developed for controllably manipulating cells within a fluidic chamber are introduced. MicroUltrasound, with its improved resolution compared to standard medical ultrasound imaging, has the potential to revolutionise many clinical procedures, particularly if miniaturised to fit within interventional tools. The design requirements and challenges of integrating an ultrasound array into a biopsy needle is discussed, with guidance and diagnostic imaging for neurosurgery as the target application.