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Progress towards transducers and arrays for real-time high frequency biomedical ultrasound imaging

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As research into transducers and arrays for real-time high frequency biomedical ultrasound imaging continues, it is becoming increasingly clear that major applications exist for systems with significantly higher spatial resolution than those already available for human clinical imaging. A key area of research remains the design and fabrication of the transducer or array. It is now accepted that piezocomposite is the material of choice and composite design and conventional dice-and-fill fabrication techniques have been optimised to allow 40 MHz operation, corresponding to wavelengths around 40 um. This expands the range of applications of piezocomposites but is still limited in terms of resolution of fine structures, for example at cellular level and to explore harmonic imaging. In this paper, we report continuing progress in work on new design techniques and fabrication processes with the potential for fabricating arrays that operate up to 100 MHz. The net-shape micromoulding fabrication technique for the ceramic within our composites is outlined, new single element transducer designs and array fabrication based on advanced surface finishing and photolithographic processes are described, and results are presented illustrating key performance data such as the point spread function, insertion loss and imaging of post mortem human tissue.