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Micro machined linear array with 100 MHz center frequency

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High-frequency ultrasound systems based on single element transducers in the frequency range of 50-120 MHz and mechanical scanning of the transducer. Linear arrays with electrical scanning can be used to increase the speed of scanning and reduce the size of the transducers. We present a linear array combined with multiplexer and single channel electronics. Working at 100 MHz, lateral resolution better than 100 μm is possible with an aperture of 1 mm². The 100 MHz array is based on silicon micro machining with a ZnO membrane as active material. The most important steps are the deposition of a 26 μm -thick ZnO thin film by magnetron sputtering and the anisotropic etching of the backside of the silicon wafer to fabricate the ZnO membrane. The individual elements of the transducer are defined by patterning a gold electrode with the desired array structure via photolithography and subsequently wet etching. Results from 32 element arrays with an 8 element 500 by 500 μm aperture agree well with numerical simulations and the shifting of the aperture works as well. Due to the cost-effectiveness of the process, a large number of applications have come now into reach for high-frequency ultrasound imaging.