Printed Circuit Board (PCB) Based Ultrasound Transducer Arrays for Multimodal Ultrasound and Photoacoustic Imaging

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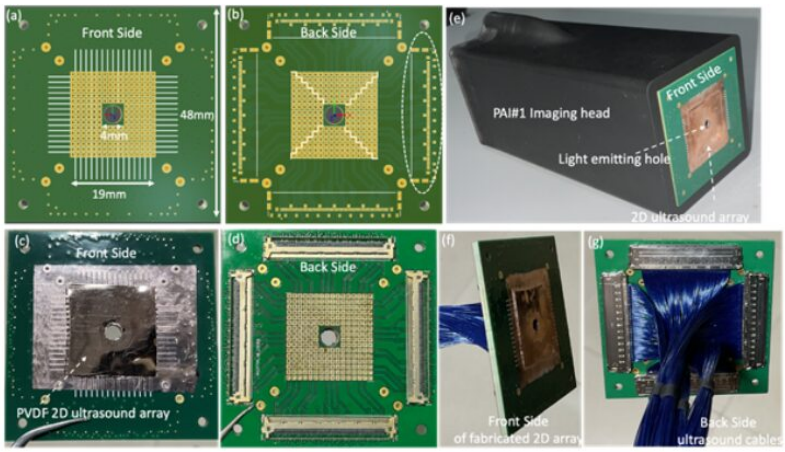

Technology Summary

Photoacoustic (PA) imaging provides deep tissue molecular imaging of chromophores with optical absorption contrast and ultrasonic resolution. Present PA imaging techniques are predominantly limited to one 2D plane per acquisition. 2D ultrasound transducers, required for real-time 3D PA imaging, are high-cost, complex to fabricate and have limited scalability in design.

Application & Market Utility

Researchers at The Pennsylvania State University have developed novel PCB-based 2D matrix ultrasound transducer arrays that are capable of being bulk manufactured at low-cost without using laborious ultrasound fabrication tools. The 2D ultrasound array specifications are easily scalable with respect to widely available PCB design and fabrication tools at low cost. To demonstrate scalability, they fabricated low (11 MHz) frequency 8×8 element and 16×16 element matrix arrays, in addition to a high (40 MHz) frequency 4×4 matrix array by directly bonding an undiced polyvinylidene fluoride (PVDF) piezoelectric material of desired thickness to the custom designed PCB substrate. Characterization results demonstrate wideband PA receive sensitivity for both low (87%) and high (188%) frequency arrays. Volumetric PA imaging results of light absorbing targets inside optical scattering medium demonstrate improved spatial resolution and field of view with increase in aperture size.

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Next Steps

Seeking licensing opportunities and collaborators.

TECHNOLOGY READINESS LEVEL 4

Seeking

Licensing | Research

Keywords

- Photoacoustic Imaging
- Ultrasound Transducer Fabrication
- 2D Matrix Transducer Array
- Printed Circuit Board (PCB)
- Polyvinylidene Fluoride (PVDF)
- Beamforming

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