

**ADVANCED
MATERIALS**
INTERFACES

Supporting Information

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CuInS₂ Quantum Dot and Polydimethylsiloxane
Nanocomposites for All-Optical Ultrasound and
Photoacoustic Imaging

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1. SEM Characterisation of CuInS_2 Coatings

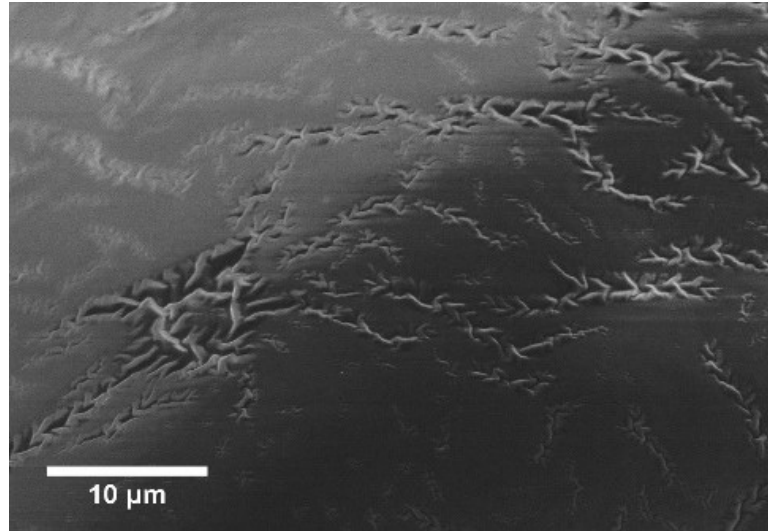


Figure 1): SEM image of fibre distal end coated with CIS QDs displaying "bird-feet" pattern.

2. TEM Characterisation of CuInS_2 Quantum Dots

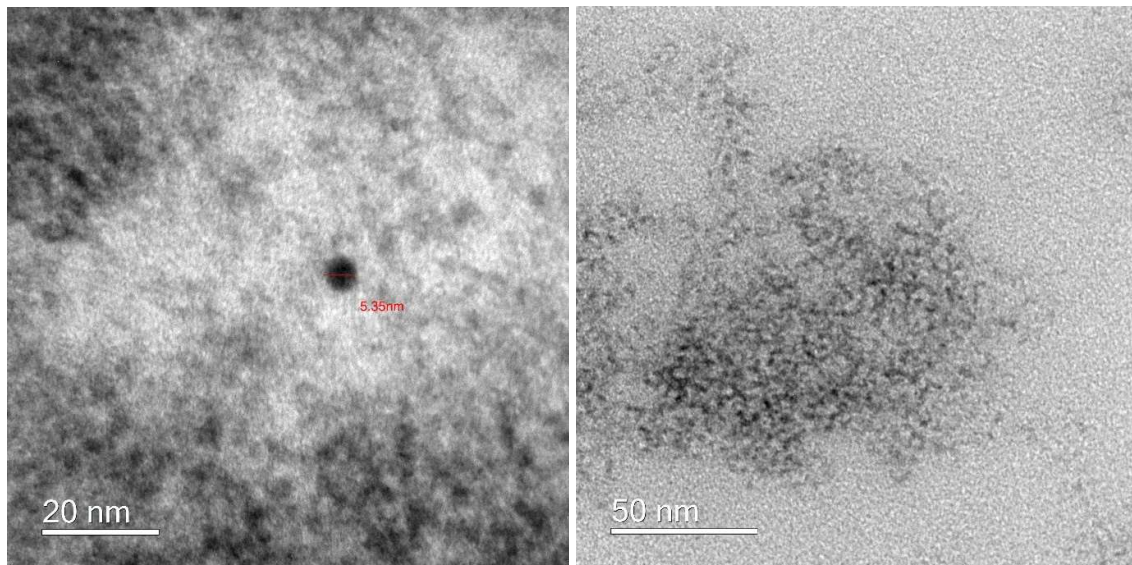


Figure 2): TEM images of CuInS_2 (CIS) quantum dots.

3. EDX Characterisation of CIS-PDMS Fibre-Optic Films

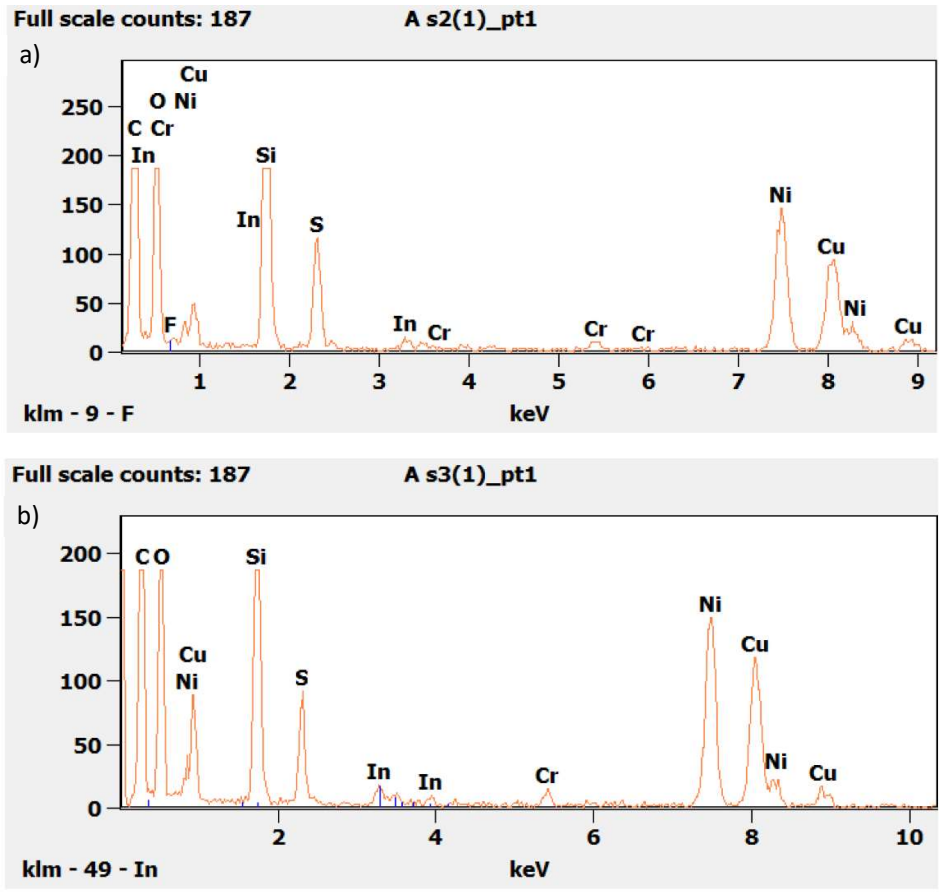


Figure 3): Energy Dispersive X-Ray Spectra of the two samples taken from the side (a) and distal end (b) of the CIS-PDMS-coated fibre.

4. Gel-Wax Ink-Filled Phantom Diagram

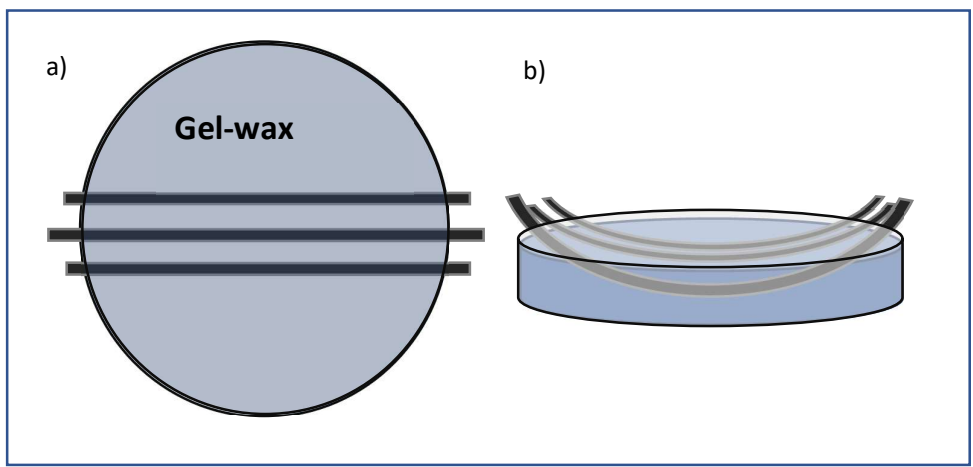


Figure 4): Schematic of ink-filled tubed phantom depicting both the above and side-on views.

5. Dual-Modality OpUS/PA Imaging Diagram

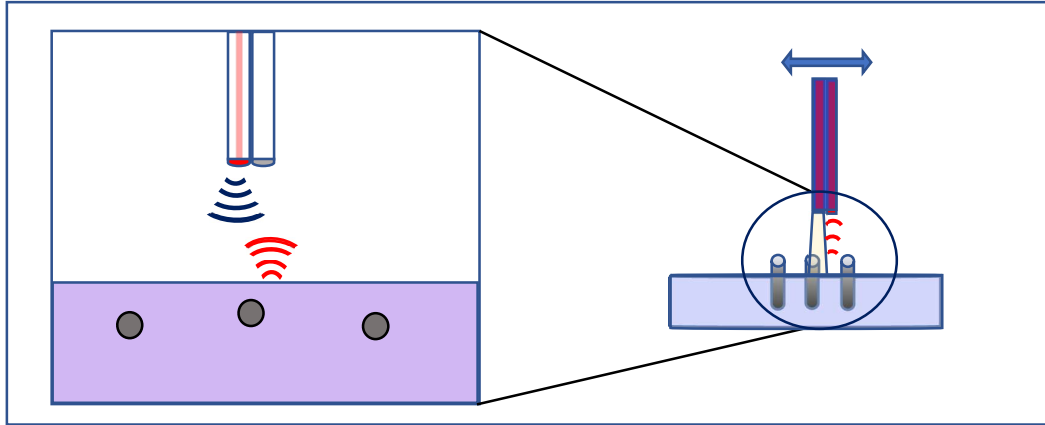


Figure 5): A schematic of fibre-optic OpUS transducer, formed from pairing CIS-PDMS coating with fibre-optic Fabry-Perot sensor, raster scanning an ink-filled tubed phantom depicting both the OpUS and PA imaging modes including a magnified view of the former.

6. OpUS, PA, and Overlaid OpUS/PA Images

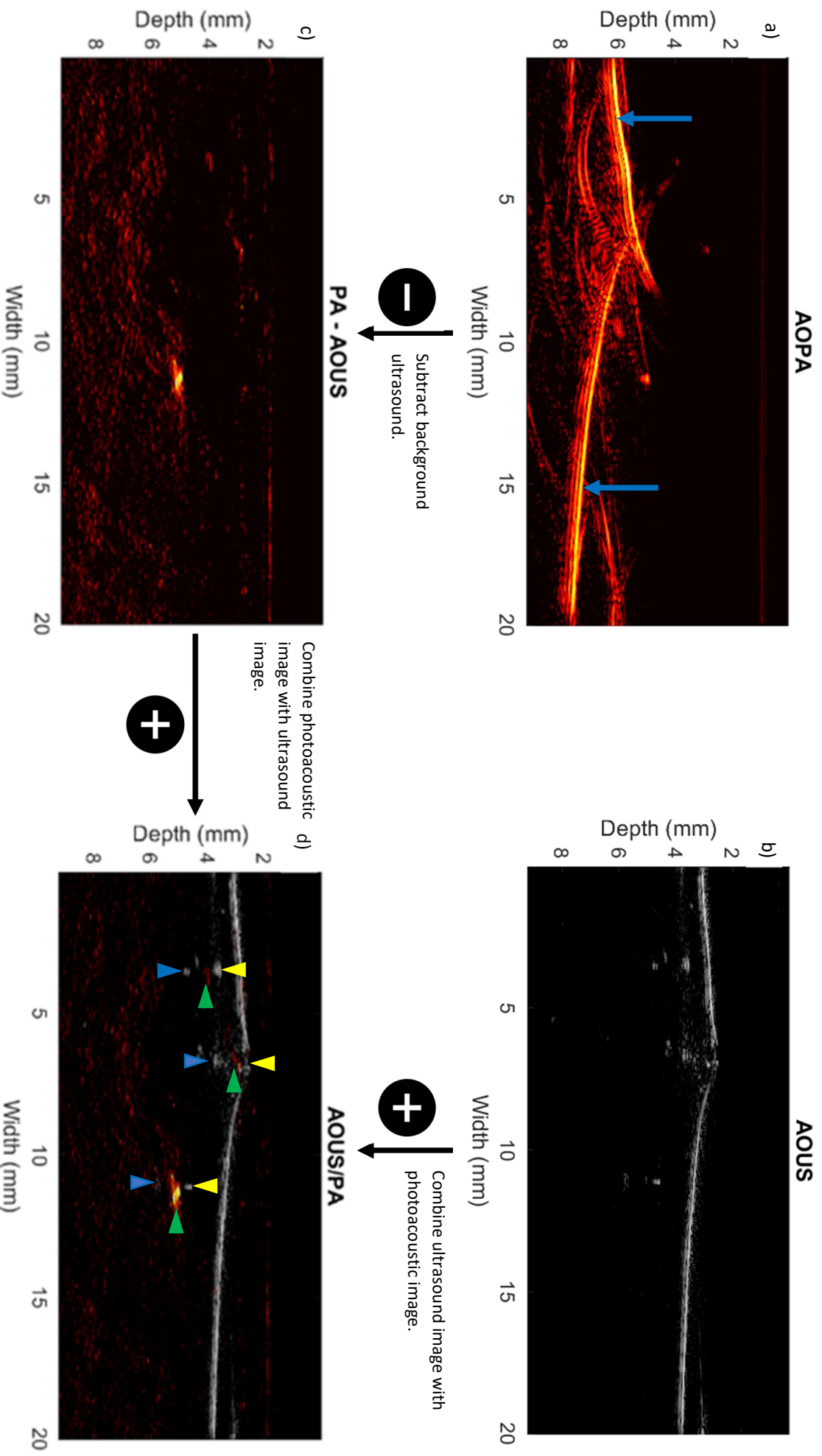


Figure 6): Acquired images of an ink-filled gel-wax phantom. a) Photoacoustic image with residual ultrasound signal highlighted by blue arrows. b) corresponding pulse-echo ultrasound image. c) Photoacoustic image from a) with ultrasound signal subtracted using a general linear model approach. d) Combined pulse-echo ultrasound (a) and photoacoustic (c) image. Arrows indicate locations of signals arising from the tubes. US top tube boundary – yellow arrow, US bottom tube boundary – blue arrow, PA signal – green arrow.

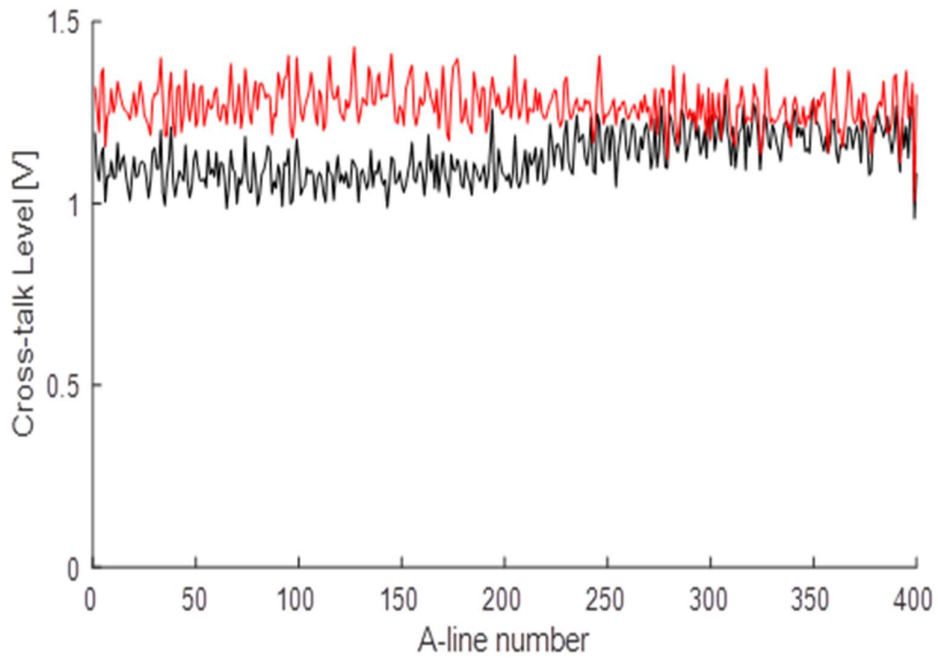


Figure 7): Peak positive (black) and negative (red) signal level recorded by the Fabry-Pérot sensor originating from ultrasound crosstalk, i.e. signal transmitted directly from the ultrasound generator to the Fabry-Pérot sensor, as a function of the time characterised by A-line scans over an extended period. Acquired at a rate of *ca.* 3 A-lines per second.

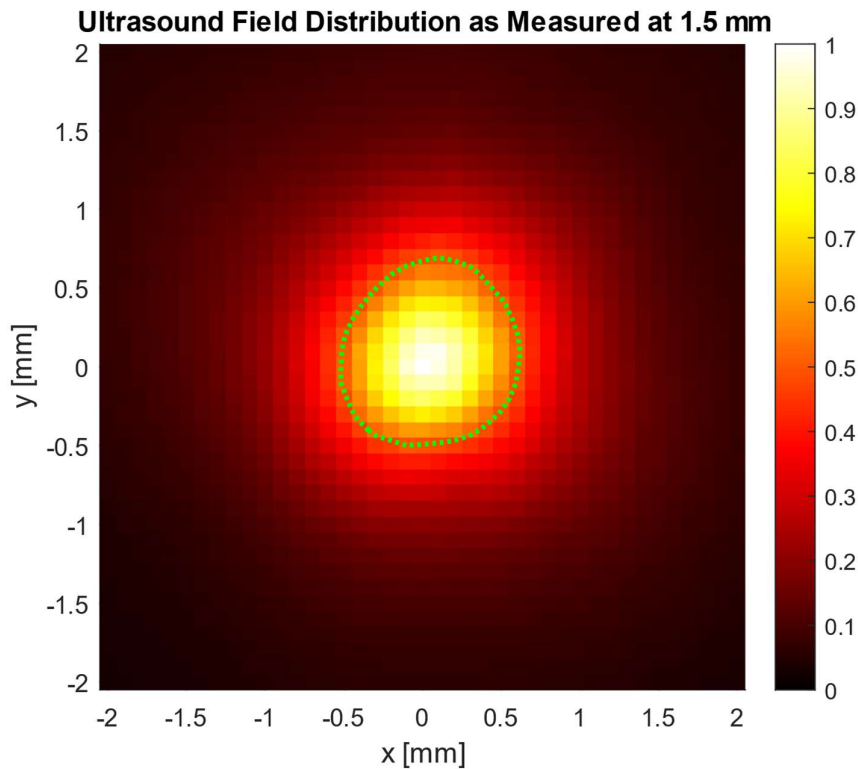


Figure 8): An example ultrasound field scan as measured at 1.5 mm from the CIS-PDMS coating. The field has been normalised to a maximum value of 1. The full-width half-maximum is shown by the dashed green contour line.