

Supplementary Material

Bend Insensitive Fiber Optic Ultrasonic Tracking Probe for Cardiovascular Interventions

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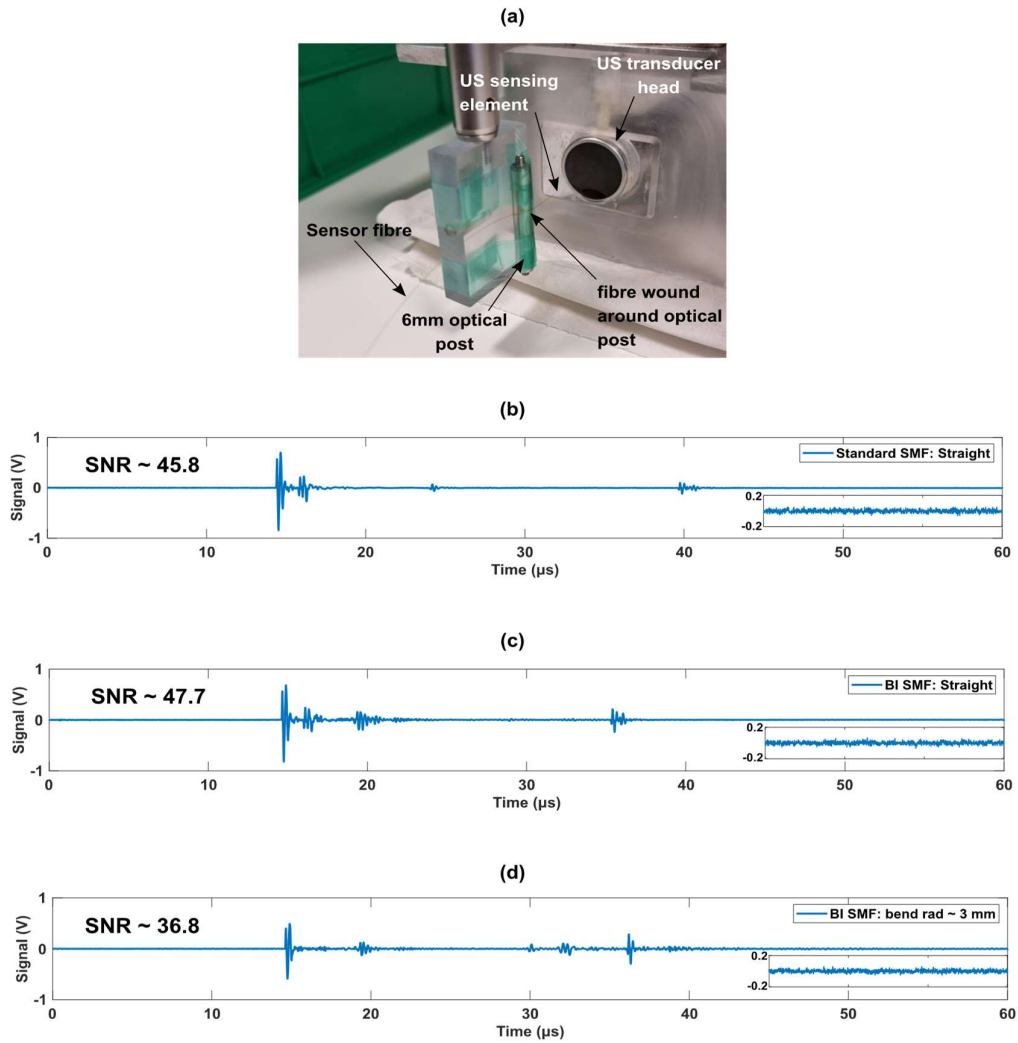


FIGURE S1 US signals detected by FOUSs based on standard SMF and BI fiber, with SNR estimates based on windowing to isolate the first peak (14 – 15 μs), (a) Experimental setup used for measurements showing the US transducer head, the distal end of the FOUS in front of it, and the bend introduced in the FOUS fibre by winding it once over a 6mm optical post (measurements were done with the setup immersed in a water tank), (b) signal detected by standard SMF based FOUS with straight distal end, (c) signal detected by BI fibre based FOUS with straight distal end, and (d) signal detected by the BI fibre based FOUS with bent distal end with bend radius ~ 3.0 mm. For each case (b), (c), & (d), the inset plot shows the noise floor without averaging.

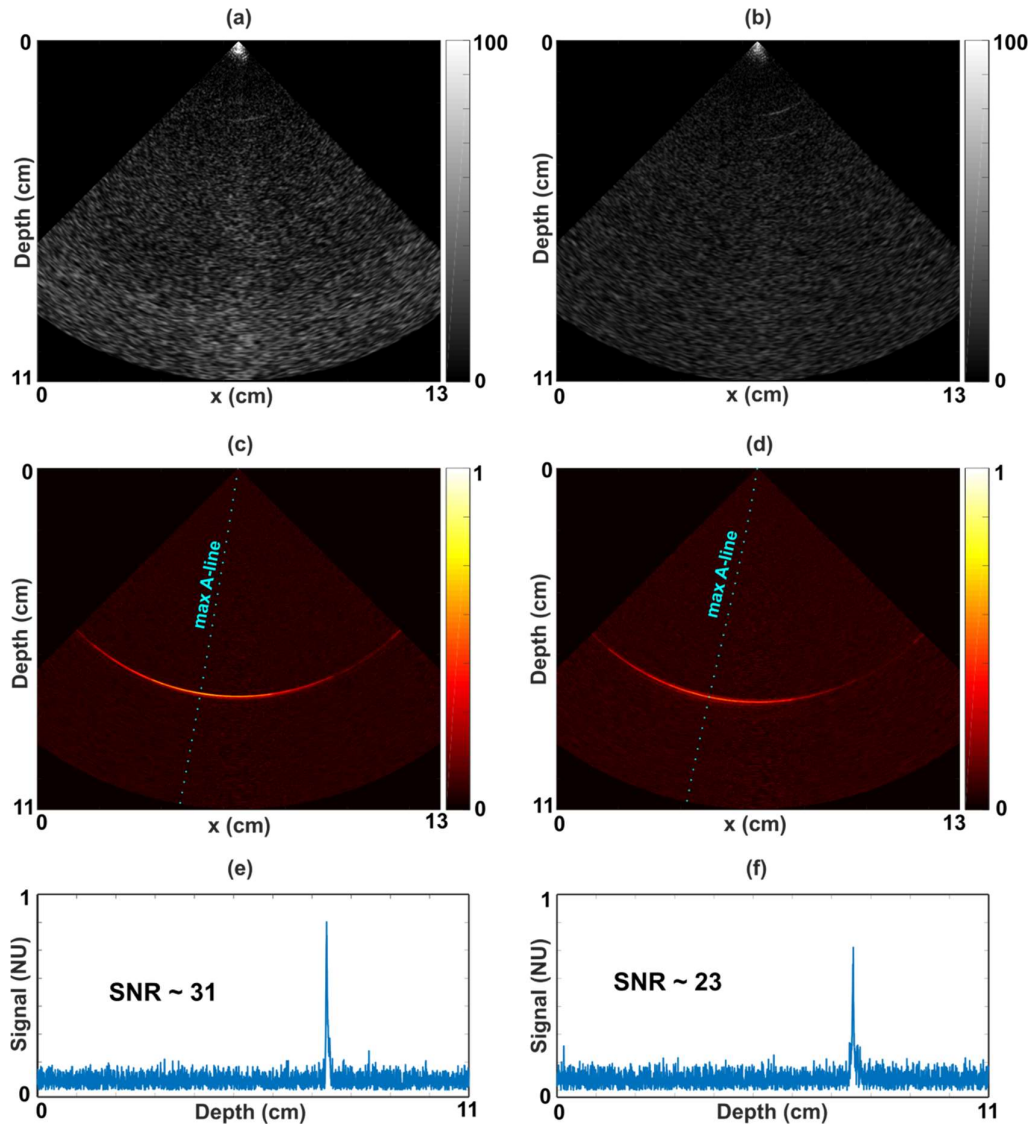


FIGURE S2 Catheter tracking in heart valve phantom with US imaging using the mTEE probe, US image of the phantom with (a) straight catheter distal end, (b) bend distal end. The corresponding 2-D image of the catheter formed by signals received by FOUS, (c) for straight catheter distal end, (d) bend distal end. The dotted line shows the maximum A-line for both cases. (e) & (f) show plots for the maximum A-line for the straight and bend distal end together with the estimated SNR for the max A-line signal.

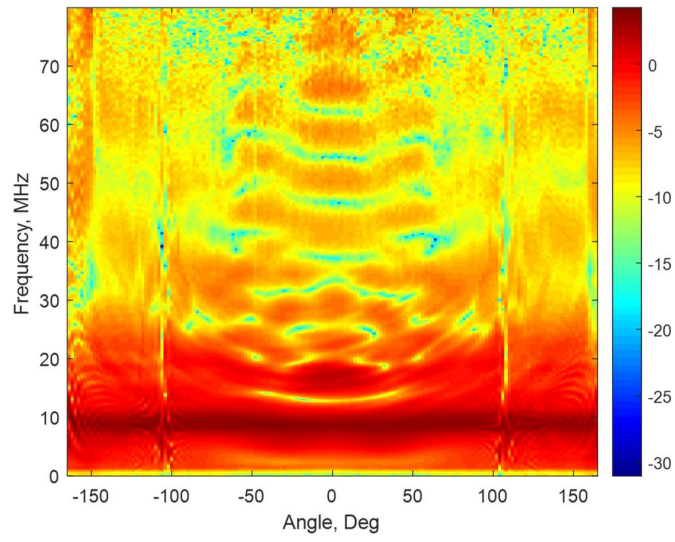


FIGURE S3 Frequency dependent directivity map of the BI FOUS for incidence angles from -165° to 165° . Over a distance of 1.5 cm from the sensing region, the fiber was straight during these tests.