**Optically resonant cavity detectors for photoacoustic and ultrasound imaging**

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The sensitive detection of broadband ultrasound waves in the hundreds of kHz to tens of MHz range underpins techniques such as biomedical photoacoustic tomography and microscopy, clinical ultrasound imaging and medical and industrial ultrasound metrology. Piezoelectric ultrasound receivers represent the current state-of-the art but present two key acoustic performance limitations. Firstly, achieving the high acoustic sensitivities required for large imaging depths in biological tissues necessitates relatively large piezoelectric element sizes on a millimetre-centimetre scale which result in a highly directional response at MHz frequencies due to spatial averaging. This can have the counter-productive effect of degrading image SNR and fidelity in applications such as photoacoustic tomography and phased array ultrasound imaging which require sub-wavelength detectors with a near omnidirectional response. Secondly, achieving the very highest sensitivities typically requires detectors that are fabricated from acoustically resonant piezoceramic materials. This can result in a sharply peaked frequency response thereby precluding a faithful representation of the incident acoustic wave and ultimately compromising image fidelity. Optical ultrasound sensors offer an alternative that is beginning to challenge the current piezoelectric dominated landscape. This applies particularly to devices based on highly sensitive optically resonant structures such as micro-rings, Fabry-Pérot etalons and in-fibre Bragg gratings. The operating principles and performance of these devices as well as their application to biomedical photoacoustic tomography, ultrasound imaging, sending and metrology will be reviewed, with specific emphasis on polymer optical cavity based sensors.