Docket #: S09-412

Improvements to high-sensitivity fiber-compatible optical acoustic sensor

An optical hydrophone that is insensitive to hydrostatic pressure, yet capable of measuring acoustic pressures as low as the background noise in the ocean in a broad frequency range of 1 Hz to 100 kHz is reported. The miniature hydrophone consists of a Fabry-Perot interferometer made of a photonic-crystal reflector interrogated with a single-mode fiber, and is compatible with existing fiber-optic technologies. Three sensors with different acoustic power ranges placed within a sub-wavelength sized hydrophone head allow a high dynamic range in the excess of 160 dB with a low harmonic distortion of better than -30 dB. A method for suppressing cross coupling between sensors in the same hydrophone head is also proposed. A prototype was fabricated, assembled, and tested. The sensitivity was measured in a frequency range of 100 Hz to 10 kHz, providing a minimum detectable pressure down to 3.5 uPa/Hz 1/2.

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Publications

- Journal of Lightwave Technology, Vol. 27, Issue 24, pp. 5648-5656 (2009)

Patents

- Published Application: 20110268384
- Published Application: WO2011115933

- Published Application: 20130340232
- Published Application: 20150330830
- Issued: 8,542,956 (USA)
- Issued: 8,897,610 (USA)
- Issued: 9,702,755 (USA)

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