CLAIMS

What is claimed is:

1. A transducer, comprising:

a conductive fiber, suspended in a viscous medium subject to wave vibrations; having a diameter and length such that at least one portion of the conductive fiber is induced by viscous drag with respect to the viscous medium to move corresponding to the wave vibrations of the viscous medium; and

a sensor, configured to determine the movement of the at least one portion of the conductive fiber, over a frequency range of the wave vibrations within the viscous medium comprising 100 Hz, by electrodynamic induction of a current in the conductive fiber by a magnetic field.

2. The transducer according to claim 1, further comprising a magnetic field generator configured to produce a magnetic field surrounding the conductive fiber, and a set of electrodes electrically interconnecting the conductive fiber to an output.

3. The transducer according to claim 2, wherein the magnetic field generator comprises a permanent magnet.

4. The transducer according to claim 1, wherein the conductive fiber comprises a plurality of parallel conductive fibers held in fixed position at respective ends of each of the plurality of parallel conductive fibers, wired in series, each disposed within a common magnetic field generated by a magnet.

5. The transducer according to claim 1, wherein the sensor is sensitive to a movement of the conductive fiber in a plane normal to a length axis of the conductive fiber.

6. The transducer according to claim 1, wherein the wave vibrations are acoustic waves and the sensor is configured to produce an audio spectrum output.

7. The transducer according to claim 1, wherein the conductive fiber is confined to a space within a wall having at least one aperture configured to pass the wave vibrations through the wall.

8. The transducer according to claim 1, wherein the conductive fiber is disposed within a magnetic field having an amplitude of at least 0.1 Tesla.

9. The transducer according to claim 1, wherein the conductive fiber is disposed within a magnetic field that inverts at least once substantially over a length of the conductive fiber.

10. The transducer according to claim 1, wherein the conductive fiber comprises a plurality of parallel conductive fibers, wherein the sensor is configured to determine an average movement of the plurality of conductive fibers in the viscous medium.

11. The transducer according to claim 1, wherein the conductive fiber comprises a plurality of conductive fibers, arranged in a spatial array, such that a sensor signal from a first of the conductive fibers cancels a sensor signal from a second of the conductive fibers under at least one state of wave vibrations of the viscous medium.

12. The transducer according to claim 1, wherein the conductive fiber is disposed within a non-optical electromagnetic field, wherein the non-optical electromagnetic field is dynamically controllable in dependence on a control signal.

13. The transducer according to claim 1, wherein the conductive fiber comprises spider silk.

14. The transducer according to claim 1, wherein the conductive fiber is selected from the group consisting of a conductive metal fiber, and a conductive synthetic polymer fiber.

15. The transducer according to claim 1, wherein the conductive fiber has a free length of at least 5 mm, and a diameter of <6μm.

16. The transducer according to claim 1, wherein the sensor produces an electrical output having a noise floor of at least 30 dBA in response to a 100 Hz acoustic wave.

17. A transducer, comprising:

at least one fiber, surrounded by a fluid, and being configured for movement by viscous drag of the fluid, and having an associated magnetic field, the at least one fiber having a radius and length such that the movement of at least a portion of the at least one fiber approximates the perturbation by waves of the fluid surrounding the at least one fiber along an axis normal to the at least one fiber; and

a sensor, configured to sense a movement of the at least one fiber having the associated magnetic field by electrodynamic induction, based on a relative displacement of a conductor and a magnetic field.

18. A method of sensing a wave in a viscous fluid, comprising:

providing a space containing a viscous fluid subject to perturbation by waves;

providing at least one fiber, surrounded by the viscous fluid, having a radius and length such that a movement of at least a portion of the at least one fiber approximates the perturbation of the fluid surrounding the at least one fiber by the waves along an axis normal to the fiber;

generating a magnetic field surrounding the at least one fiber;

providing a set of electrodes electrically interconnected with the at least one fiber; and

transducing the movement of at least one fiber to an electrical signal across the set of electrodes through electrodynamic induction.

19. The method according to claim 18, wherein the electrical signal across the set of electrodes has a minimum sensitivity of 10^{-3} volts/pascal.

20. The method according to claim 18, wherein the waves are acoustic waves within an audio spectrum, and the electrical signal corresponds to the acoustic waves in an audio output.