CLAIMS

What is Claimed is:

1. A sensing component of a gyroscope, the sensing component comprising,

a frame;

a proof mass configured to be displaced relative to the frame in response to a Coriolis force applied to the sensing component; and

a photonic crystal cavity comprising,

a first photonic crystal coupled to the proof mass; and

a second photonic crystal coupled to the frame;

wherein the first and second photonic crystals each comprises a~~n~~ two-dimensional (2D) array of holes formed thereon;

wherein the first and second photonic crystals are separate photonic crystals not directly connected to each other;

wherein the photonic crystal cavity is configured to generate an optical output in response to the Coriolis force, and

wherein the sensing component is configured to measure the Coriolis force based on the optical output.

2. The sensing component according to claim 1,

wherein the photonic crystal cavity further comprises a gap defined between the first and second photonic crystals;

wherein the gap comprises a gap size that is defined as the distance between two opposing surfaces of the first and second photonic crystals; and

wherein the optical output of the photonic crystal cavity is configured to be modulated by a change in the gap size.

3. The sensing component according to claim 2,

wherein the first photonic crystal is configured to move in tandem with the proof mass; and

wherein the gap size is configured to change in response to the movement of the first photonic crystal.

4. The sensing component according to claim 2 or 3,

wherein the change in the gap size causes boundary conditions and optical confinement parameters of the photonic crystal cavity to be changed, which in turn causes the optical output of the photonic crystal cavity to be changed.

5. The sensing component according to claim 1,

wherein the photonic crystal cavity further comprises a third photonic crystal coupled to the first photonic crystal and the second photonic crystal, such that the third photonic crystal is positioned at the center of the photonic crystal cavity between the first photonic crystal and the second photonic crystal; and

wherein the third photonic crystal is configured to be deformed in response to a tensor applied by the first photonic crystal.

6. The sensing component according to claim 5,

wherein deformation of the third photonic crystal causes one or more optical properties of the third photonic crystal to be changed, which in turn causes the optical output of the photonic crystal cavity to be changed.

7. The sensing component according to claim 5 or 6, wherein the third photonic crystal is smaller in size than the first photonic crystal and the second photonic crystal.

8. The sensing component according to claim 6 or 7, wherein the one or more optical properties of the second photonic crystal comprises permittivity.

9. The sensing component according to any one of claims 1 to 8, wherein the optical output comprises an optical resonance frequency of the photonic crystal cavity.

10. The sensing component according to any one of claims 1 to 9, wherein the first and second photonic crystals are symmetrically arranged with respect to each other.

11. The sensing component according to any one of claims 1 to 10, wherein the array of holes in the first and second photonic crystals comprise a periodic arrangement of holes.

12. The sensing component according to any one of claims 5 to 11, wherein the third photonic crystal comprises an array of holes with a periodic arrangement.

13. The sensing component according to any one of claims 1 to 12,

wherein the first photonic crystal is configured to move in tandem with the proof mass; and

wherein the second photonic crystal is configured to be stationary with respect to the frame.

14. The sensing component according to any one of claims 1 to 13, wherein the proof mass, the first and second photonic crystals are made of silicon nitride (SiN).

15. The sensing component according to any one of claim 1 to 13, wherein the proof mass, the first and second photonic crystals are made of silicon.

16. An opto-MEMS gyroscope, comprising

a sensing component configured to probe a sense mode of the gyroscope, the sensing component comprising,

a frame;

a proof mass configured to be displaced relative to the frame in response to a Coriolis force applied to the sensing component; and

a photonic crystal cavity comprising,

a first photonic crystal coupled to the proof mass; and

a second photonic crystal coupled to the frame;

wherein the first and second photonic crystals each comprises a~~n~~ 2D array of holes formed thereon;

wherein the first and second photonic crystals are separate photonic crystals

not directly connected to each other;

wherein the photonic crystal cavity is configured to generate an optical output in response to the Coriolis force, and

wherein the sensing component is configured to measure Coriolis force based on the optical output.

17. The opto-MEMS gyroscope according to claim 16,

wherein the photonic crystal cavity further comprises a gap defined between the first and second photonic crystals;

wherein the gap has a gap size that is defined as the distance between two opposing faces of the first and second photonic crystals; and

wherein the optical output of the photonic crystal cavity is configured to be modulated by a change in the gap size.

18. The opto-MEMS gyroscope according to claim 16,

wherein the photonic crystal cavity further comprises a third photonic crystal coupled to the first photonic crystal and the second photonic crystal, such that the third photonic crystal is positioned at the center of the photonic crystal cavity between the first photonic crystal and the second photonic crystal; and

wherein the third photonic crystal is configured to be deformed in response to a tensor applied by the first photonic crystal.

19. The opto-MEMS gyroscope according to any one of claims 16 to 18, further comprising

a chip;

a drive frame;

a plurality of nano tethers configured to suspend the drive frame;

a drive sensor configured to probe a drive mode of the gyroscope;

a calibration sensor configured to calibrate motion of the drive frame; and

a drive capacitor configured to provide electrostatic impulses for the drive mode.

20. The opto-MEMS gyroscope according to any one of claims 16 to 19, wherein the opto-MEMS gyroscope is configured to measure angular velocity based on the

Coriolis force measured by the sensing component.