CLAIMS

1. An optical interrogation system (200, 300) for collecting information from at least one optical sensor (202, 302) in a structure (100), comprising:

an optical signal generator (208, 232, 308a, 308b) for communicating with the at least one optical sensor (202, 302), and optical signal receiving apparatus (208, 232, 308a, 308b) for collecting optical signals returned by the at least one optical sensor (202),

each optical sensor (202, 302) comprising a fiber optic strand (106) and a photonic crystal (102) wafer mounted on the fiber optic strand (106).

2. The optical interrogation system (200, 300) of claim 1, wherein the fiber optic strand (106) is provided with a polished end face (104), and the photonic crystal (102) wafer is secured onto the polished end face (104) of the fiber optic strand (106).

3. The optical interrogation system (200, 300) of any of claims 1 and 2, wherein the photonic crystal (102) wafer detects changes in a reflectivity spectrum of a range of wavelengths.

4. The optical interrogation system (200, 300) of any of the preceding claims, further including switching mechanisms arranged between the optical signal generator (208, 232, 308a, 308b) and the optical signal receiving apparatus (208, 232, 308a, 308b), such that two or more optical signals can be transmitted or received at a same time.

5. The optical interrogation system (200, 300) of claim 4, wherein the switching mechanisms comprise wavelength division multiplex switches (204, 304b).

6. The optical interrogation system (200, 300) of claim 4, wherein the switching mechanisms comprise MEMS switches (304a).

7. The optical interrogation system (200, 300) of any of the preceding claims, wherein the optical signal generator (208, 232, 308a, 308b) comprises a laser.

8. The optical interrogation system (200, 300) of any of the preceding claims, wherein the optical signal generator (208, 232, 308a, 308b) comprises an LED.

9. The optical interrogation system (200, 300) of any of the preceding claims, wherein the optical fiber comprises a side-scattering light guide, and a length of photonic crystal (102) material carried on an end (104) of the optical fiber (106) that is monitored by the optical fiber (106).

10. The optical interrogation system (200, 300) of any of the preceding claims, and further including voltage altering apparatus coupled with the photonic crystal (102) to control reflectance properties of the crystal (102).

11. The optical interrogation system (200, 300) of any of the preceding claims, wherein the optical sensor (202, 302) detects at least one of a pressure, a temperature, chemical materials and biological materials.

CLAIMS

1. An optical interrogation system (200, 300) for collecting information from at least one optical sensor (202, 302) in a structure (100), comprising:

an optical generator (208, 232, 308a, 308b) for communicating with the at least one optical sensor (202, 302), and optical signal receiving apparatus (208, 232, 308a, 308b) for collecting optical signals returned by the at least one optical sensor (202),

each optical sensor (202, 302) comprising a fiber optic strand (106) and a photonic crystal (102) wafer mounted on the fiber optic strand (106);

wherein the fiber optic strand (106) comprises a side-scattering light guide and a length of photonic crystal (102) material carried on an end (104) of the fiber optic strand (106) that is monitored by the fiber optic strand (106).

2. The optical interrogation system (200, 300) of claim 1, wherein the fiber optic strand (106) is provided with a polished end face (104), and the photonic crystal (102) wafer is secured onto the polished end face (104) of the fiber optic strand (106).

3. The optical interrogation system (200, 300) of any of claims 1 and 2, wherein the photonic crystal (102) wafer detects changes in the reflectivity spectrum of a range of wavelengths.

4. The optical interrogation system (200, 300) of any of the preceding claims further including switching mechanisms arranged between the optical signal generator (208, 232, 308a, 308b) and the optical signal receiving apparatus (208, 232, 308a, 308b), such that two or more optical signals can be transmitted or received at the same time.

5. The optical interrogation system (200, 300) of claim 4, wherein the switching mechanisms comprise wavelength division multiplex switches (204, 304b).

6. The optical interrogation system (200, 300) of claim 4, wherein the switching mechanisms comprise MEMS switches (304a).

7. The optical interrogation system (200, 300) of any of the preceding claims, wherein the optical signal generator (208, 232, 308a, 308b) comprises a laser.

8. The optical interrogation system (200, 300) of any of the preceding claims, wherein the optical signal generator (208, 232, 308a, 308b) comprises an LED.

9. The optical interrogation system (200, 300) of any of the preceding claims, and further including voltage altering apparatus coupled with the photonic crystal (102) to control the reflectance properties of the crystal (102).

10. The optical interrogation system (200, 300) of any of the preceding claims, wherein the optical sensor (202, 302) detects at least one of a pressure, a temperature, chemical materials and biological materials.