T18-090

Tohoku University's Invention

Photonic metamaterial with metal/dielectric/metal 3 layers structure

Improve significantly sensor sensitivity thanks to the structure where the dielectric thickness changes with external force

Summary

Photonic metamaterial is an artificial structure having properties which does not exist in the nature for electromagnetic waves including light. It can be applied to different equipment.

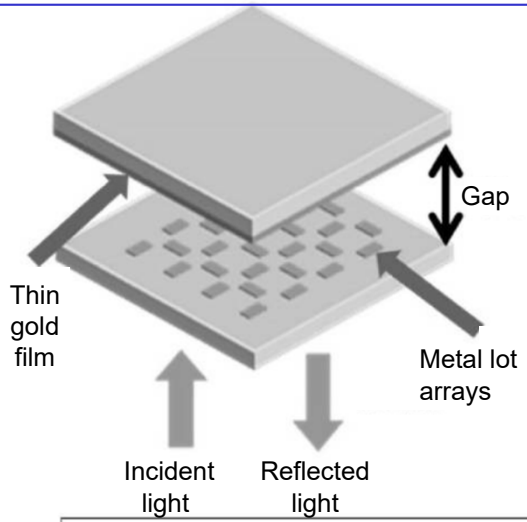
This invention can provide a photonic metamaterial with metal/ dielectric /metal 3 layers structure that has high sensitivity and could be used for pressure or displacement sensors. This invention is characterized by a 3 layers metamaterial consisting of metal/ dielectric /metal that functions as wavelength selective absorber with high performance at surface plasmon resonance wavelengths. Moreover, since the thickness of the insulator layer is changed by external force, it is possible to increase the volume of resonance wavelength change as a function of insulator layer thickness, and thus the sensor sensitivity can be greatly improved.

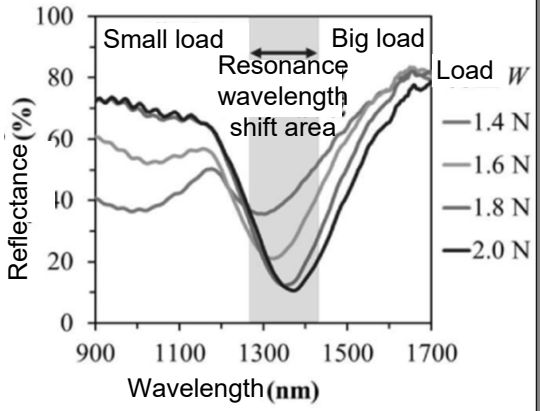
Effect

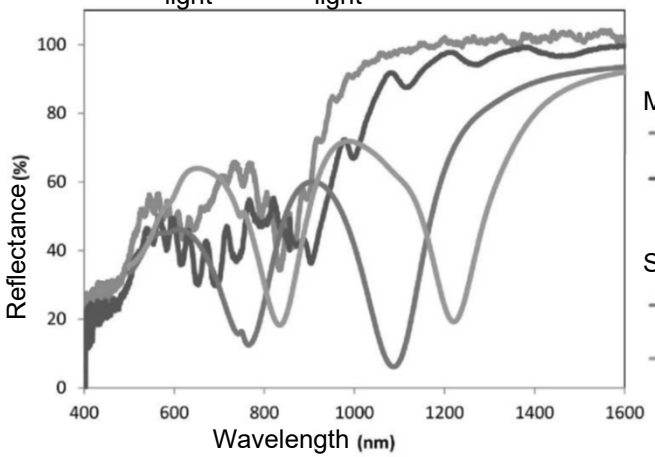
Significant improvement of sensor sensitivity

Application

Application into large domain: ultra high sensitivity force gauge, contact sensor, touch panel, biosensor, waterproof pressure sensor, intracorporeally pressure sensing, optical tactile sensors, small & light pressure sensors, and blood pressure/respiration/heartbeat biometric sensing measurement, etc.







【Up left】Example of photonic metamaterial with air gap structure
【Up right】Relation between wavelength and reflectance measured with load difference
【Down left】Reflectance of photonic metamaterial with air gap structure

Patent Data Sheet

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