

## Grating Assisted Surface Plasmon Resonance Sensor for Monitoring of Hazardous Toxic Chemicals and Gases in an Underground Mines

**Authors :** Sanjeev Kumar Raghuwanshi, Yadendra Singh

**Abstract :** The objective of this paper is to develop and optimize the Fiber Bragg (FBG) grating based Surface Plasmon Resonance (SPR) sensor for monitoring the hazardous toxic chemicals and gases in underground mines or any industrial area. A fully cladded telecommunication standard FBG is proposed to develop to produce surface plasmon resonance. A thin few nm gold/silver film (subject to optimization) is proposed to apply over the FBG sensing head using e-beam deposition method. Sensitivity enhancement of the sensor will be done by adding a composite nanostructured Graphene Oxide (GO) sensing layer using the spin coating method. Both sensor configurations suppose to demonstrate high responsiveness towards the changes in resonance wavelength. The GO enhanced sensor may show increased sensitivity of many fold compared to the gold coated traditional fibre optic sensor. Our work is focused on to optimize GO, multilayer structure and to develop fibre coating techniques that will serve well for sensitive and multifunctional detection of hazardous chemicals. This research proposal shows great potential towards future development of optical fiber sensors using readily available components such as Bragg gratings as highly sensitive chemical sensors in areas such as environmental sensing.

**Keywords :** surface plasmon resonance, fibre Bragg grating, sensitivity, toxic gases, MATRIX method

**Conference Title :** ICOP 2018 : International Conference on Optics and Photonics

**Conference Location :** Singapore, Singapore

**Conference Dates :** November 22-23, 2018