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Patent Search

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Abstract:

The invention discloses a system 100 for monitoring underground mines using a Fiber Bragg Grating (FBG) chemical sensor, said system 100 comprising: a FBG chemical sensor 101; a processor 102; a computer readable medium 104; a display 106; a user interface 108; an IOT device 110; a communication network 112; and a memory communicatively coupled to the processor 102. The method of monitoring hazardous toxic chemicals in underground mines comprising: fabricating said Fiber Bragg Grating (FBG) with a specific Bragg wavelength; depositing a thin metal film of at least one of gold layer or silver layer; coating said FBG over said thin metal film with a reduced Graphene Oxide (rGO); monitoring Surface Plasmon Resonance; identifying said data by setting up a high-resolution tunable fiber ring laser interrogator; and sending said data to the server for real time monitoring of the leakage of hazardous toxic chemical.

[Complete Specification](#)

FIELD OF THE INVENTION

The present invention generally relates to the field of chemical sensor and Artificial Intelligence (AI) for monitoring leakage of hazardous chemicals in the underground mines. The invention particularly relates to system and method of monitoring underground mines using a Fiber Bragg Grating (FBG) chemical sensor coated with suitable materials sensing layer.

(2) BACKGROUND OF THE INVENTION

The gases commonly found in mines are oxygen, nitrogen, carbon dioxide, and methane. Gases like hydrogen sulfide, carbon monoxide, and oxides of nitrogen are also found to occur, though rarely. The knowledge of these gases and their properties, as well as their physiological effects on human beings, is essential for development and selection of suitable sensors for the detection of harmful gases, as well as taking appropriate measures to avoid any untoward incidences.

Earth's atmosphere in general contains approximately 78% nitrogen, 21% oxygen, and 1% other gases by volume on a moisture-free basis. However, as the air passes through the network of underground openings, its composition changes. There are two primary reasons for this. First, the mining of subsurface structures allows gases entrapped in the surrounding strata to escape into the ventilating airstreams. Methane and carbon dioxide are two such commonly occurring strata gases. Secondly, a number of chemical reactions may cause changes in the composition of mines air.

Due to extensive coal mining and vigorous growth of industries in this area water resources have been badly contaminated. The habitants have however been

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