

# DETECTING TRACE NO<sub>2</sub> POLLUTANT IN AIR



## INVENTION

The patented invention is a system of measuring trace amount of NO<sub>2</sub> pollutant in open ambient air using Tunable Diode Laser Absorption Spectroscopy (TDLAS) technique.

## MARKET NEED AND GROWTH

Air quality standards exist worldwide for pollutants that are considered harmful to environment and public health. NO<sub>2</sub> is one of major pollutants. It is corrosive in nature and creates photochemical smog. Exposure can create health problems such as eye, nose, and throat irritation, and increased respiratory infections.

Two types of instruments are available in market to detect pollutants in air: point-monitoring and long-path monitoring. The latter offers average measure of pollutant over large areas.

The growing problem of pollution from industry and vehicles has led to increase in demand of sensing instruments. Outdoor air monitoring constitutes 39.1% of global market and will lead the market with growth expected at a CAGR of 14.3% through 2022.<sup>1</sup>

## APPLICATION

Ambient outdoor air monitoring in urban, industrial and rural areas over long paths

## ADVANTAGES

- Compared to Differential Optical Absorption Spectroscopy, there is no need for spectrometer or expensive collimation optical components
- Robust and cheap method
- Blue lasers have long lifetime and low power consumption
- Eliminated misidentifying absorption from dirt or dust
- Detection limit of 2 ppb over a distance of 400m

## PROJECT STATUS

- An experimental setup was made utilizing commercially available components (multimode blue laser diode, current, temperature and mass flow controllers, photodiode detector and camera)
- A detection limit of 4 ppm in a 40 cm gas cell was achieved
- Detection time of 5 sec, precision of 0.1 ppb, minimum detection of 0.1 ppb, range of 0.1 ppb to 1 ppm.

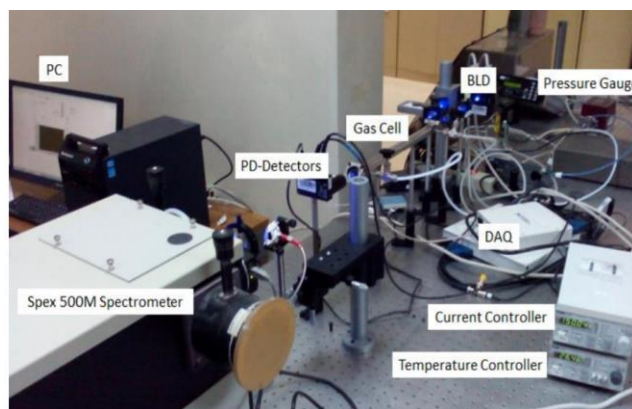


Photo of Experimental Setup

## LOOKING FOR DEVELOPMENT PARTNER

We are looking for:

- industry feedback on the invention
- a partner company to develop and package this technology complying with market needs and industry standards.

Our ultimate objective is to license the intellectual property (IP) to a company for commercialization.

## PATENT PROTECTION

A U.S. patent [10613067](#) covers method and system of measuring NO<sub>2</sub> using the laser. The IP is owned by King Fahd University of Petroleum & Minerals (KFUPM).

## ABOUT KFUPM

KFUPM was established in year 1963 and is located in Dhahran city of Saudi Arabia. KFUPM currently ranks at 163 in QS World University Rankings 2022.

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<sup>1</sup> Sensors For Trace Contaminant in Air, June 2019, BCC Research