

Quick scan: How polluted is the air you breathe?

IIT-Gn Develops Portable Device For Instant Answers

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Ahmedabad: It's the time of the year again when citizens in the national capital and closer home in Ahmedabad get jittery about the very air they breathe. Given the serious air pollution problem, a team of faculty members and students of IIT Gandhinagar (IIT-Gn) developed an indigenous laser-based portable device which measures the level of pollutants in the air.

The current system, employed by CPCB or SAFAR, has fixed devices and can't ascertain the local impact of vehicular and other types of pollution. The IIT-Gn team claims to have employed the first portable tunable diode laser spectroscopy (TDLS) system in the Indian context, which provides a highly localized reading of air pollution, be it outside your home or on the road you use.

The system has been developed by a team led by Arup Lal Chakraborty, associate professor (electrical engineering) at IIT-Gn with doctoral student Anirban Roy as the primary investigator. Other members include Neetesh Kumar Sharma from IIT-Gn and Abhishek

HOW THE SYSTEM WORKS

► A laser diode is fired against a photodetector in the device at the desired height

► The laser detects specific molecules and the resonance reading is relayed to the amplifier and oscilloscope which appears as a graph on the software

► The graph then can be decoded on the basis of the elements covered in the experiment, for example carbon dioxide and water vapour was studied in this experiment



► Exhaustive data collection from various sites can create a map showing the impact of vehicular pollution, wind speed and precipitation

MEAN VALUE OF MOLE FRACTION FOR CARBON DIOXIDE

| Palaj, Gandhinagar | Infocity, Gandhinagar | Chandkheda, Ahmedabad | Sabarmati, Ahmedabad |
|--------------------|-----------------------|-----------------------|----------------------|
| 438 ppm | 495 ppm | 495 ppm | 740 ppm |

Upadhyay from the University of Strathclyde, Glasgow.

"The device has to be kept at the desired level - at ground level or a particular height - after which the laser beam, tuned for specific particle size and detection of specific components, in this context carbon dioxide, takes readings. We have also developed an accompanying mobile phone application to give real time readings. Compared to other systems, it is portable and can be fitted to a car or even buses, to create an exhaustive pollutant map," said Chakraborty.

Roy said urban areas are

batling pollution from multiple sources, from thermal power stations to vehicular population. "The global average of CO₂ is 406.7 ppm (parts per million), which was found on the outskirts of Ahmedabad. Inside Ahmedabad, these values were found to be alarmingly high, 727 ppm and 877 ppm, at Chandkheda and Sabarmati, the two locations chosen for the pilot study," he said.

The project which began in 2015 will now be expanded to more polluted locations such as Vajl and Ankleshwar, members of the team said.

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