



## Zelosos por Buenas Renovables (Mexico)

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English translation

### Transcendent scientific breakthrough in laser technology for the detection of substances



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Scientists at Nanyang Technological University, Singapore (NTU Singapore) have made a momentous discovery in laser technology that could revolutionize the detection of pollutants and hazardous gases. Using specially designed optical fibers with hollow cores, researchers have developed a novel method to produce intense, ultra-fast mid-infrared lasers. These lasers are instrumental in creating highly sensitive devices capable of detecting minute amounts of substances that would otherwise be difficult to identify.

Traditionally, mid-infrared lasers have been used to quickly analyze the composition of the air, detecting greenhouse gases, toxic substances, explosives, and even diseases present in a person's breath. However, existing methods for generating these lasers have limitations. One method requires controlled laboratory conditions, free from disturbances such as vibrations and changes in temperature and humidity, making them unsuitable for outdoor use. Another method can resist environmental interference, but lasers lack the intensity needed to accurately detect small amounts of substances.

Researchers at NTU Singapore have tackled these challenges using hollow core fibres with carefully tuned substructures. By manipulating the thickness of the fiber's mini tubes, the team was able to produce bright mid-infrared lasers within the electromagnetic spectrum. These lasers have wavelengths from 2 to 20 micrometers and offer distinct advantages over other lasers when it comes to detecting substances.

With the new method, portable and powerful mid-infrared laser generators can be developed without the need for controlled laboratory environments. This allows users to combine lasers with

detectors and identify a wide variety of unknown substances directly in the field, without the need for time-consuming laboratory testing.

This momentous research, led by NTU Assistant Professor Chang Wonkeun, represents a significant step forward in laser technology. The team's findings have been published in the prestigious journal *Laser & Photonics Reviews*.

### **Frequently Asked Questions (FAQ)**

#### **Q: What are mid-infrared lasers?**

Mid-infrared lasers are lasers with wavelengths ranging from 2 to 20 micrometers. They are particularly useful in detecting substances because of the unique ways in which different molecules absorb lasers in this range.

#### **Q: How are newly developed mid-infrared lasers different from existing ones?**

The newly developed lasers are generated using hollow-core fibers with tight substructures. This design enables the production of intense, ultra-fast mid-infrared lasers that can accurately detect minute amounts of substances.

#### **Q: Can these lasers be used outside of laboratories?**

Yes, the new method developed by NTU Singapore researchers enables the creation of portable mid-infrared laser generators. These lasers can be used in the field without the need for controlled, vibration-free environments.

#### **Q: What are the possible applications of these powerful mid-infrared lasers?**

The applications of these lasers are numerous. They can be used to quickly identify pollutants, toxic substances, explosives, and diseases present in a person's breath. The portability of lasers allows for on-site testing, eliminating the need to send samples to labs.

#### **Q: Are mid-infrared lasers affected by the presence of water molecules in substances?**

Unlike other lasers, mid-infrared lasers are not affected by the presence of water molecules in substances. This makes them highly accurate and reliable for the detection of substances, even when water is present.

<https://zbr.com.mx/sin-categoria-es/novel-method-generates-powerful-and-portable-mid-infrared-lasers-for-detecting-pollutants/631636/>