Novel chemical sensor six-times faster than alternatives

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Credit: AI-generated image (disclaimer)

Tragic events such as the recent Brussels Airport bombing have enlightened the need for stronger security measures and improved technologies. This is one of the applications the MIRPHAB project team had in mind, as they unveiled a chemical sensor capable of detecting the likes of drugs and explosives from a distance of 30m.

'We are making the next generation of sensors that are compact, low cost, low on power consumption and capable of real-time detection where the speed and sensibility is unrivalled,' proudly announces Sergio Nicoletti, coordinator of the MIRPHAB project. The new sensor, which reads the unique frequencies given off when liquids or gases interact with light, could soon be installed at the entrance or airports, scanning crowds and bags for suspicious materials before they enter the building.

The latter is actually just one of many potential applications that the team contemplates. Amongst other things, the mid-IT sensor can detect diseases, scan for bacteria in fridges, detect the presence of alcohol or even monitor carbon emissions to help mitigate climate change.

Jose Pozo, director of technology and innovation at the European Photonics Industry Consortium, says this breakthrough could lead to new business and commercial opportunities for SMEs and large industrial groups. The foreseen pilot line will not only enable reduced cost, power consumption and size, but the exploitation of a mixed Si/III-V technology is also foreseen to open the way to applications not addressable with current technologies and components.

Unmatched performance

The new sensor harnesses new photonics technology and uses the MIR wavelength band (3 + 12 μm) for greater performance. In this so-called 'fingerprint region', chemicals exhibit intense absorption features that allow for 'unmatched detection of capabilities and unambiguous identification'.

The device can detect chemicals at a rate of 1 200 per hour – over six times more than standard portal scanners - and is also incredibly small. 'We want to shrink current technology down to the size of a mobile phone', says Nicoletti. To achieve this, the R&D process taps into

project partners' expertise in the field of spectroscopy, MIR optolelectronics, sensing systems and applications.

Objective 2020

The MIRPHAB project is built around an 18-strong consortium. It benefits from EUR 13 million of funding from the European Commission's Photonics Public Private Partnership (PPP) as well as EUR 2 million from the Swiss government.

The team aims to create its supply chain to make ready-for-use sensing devices by 2020. It is one of three manufacturing pilot lines supported by Horizon 2020 to boost Europe's competitiveness in the sector. The other two are PIX4LIFE, a photonics platform for health applications, and PI-SCALE, which is hoped to accelerate the commercial adoption of OLED technology.

More information: Project website: www.mirphab.eu/

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