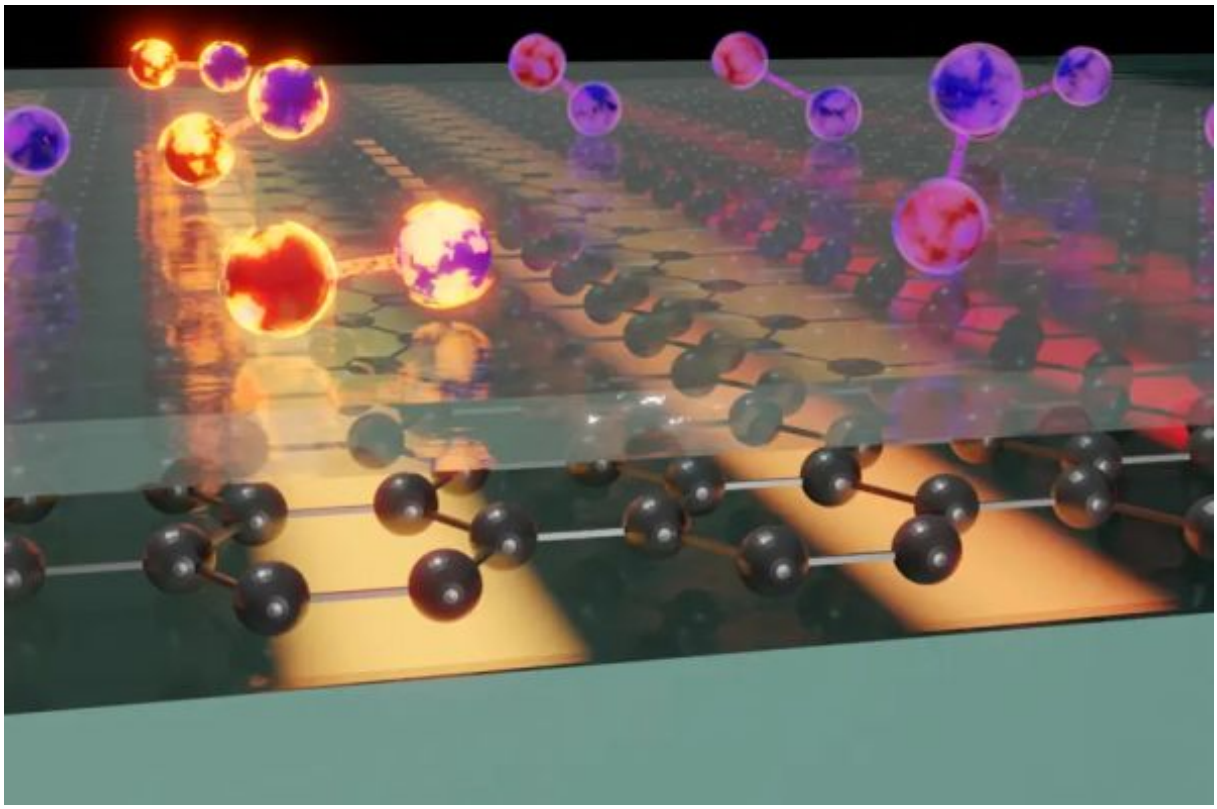

Proof of Concept Grant

ICREA Prof at ICFO Frank Koppens receives new ERC Funding to develop an optical (infrared) gas sensor demonstrator chip based on a novel graphene electro-polaritonic platform

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The European Research Council, in its efforts to help ERC grant-holders to bridge the gap between their research and the earliest stage of a marketable innovation, created the Proof of Concept (PoC) funding scheme for researchers who have already been awarded an ERC grant. The grants are part of the EU's research and innovation program, Horizon Europe. Not only does this program help bring ERC grantees closer to the possibility of commercializing their research findings, the program complements the efforts of ICFO's Knowledge and Technology Transfer Unit (KTT), which proactively searches for ways to translate newly generated knowledge into new technologies.

ICREA Prof at **ICFO Dr Frank Koppens**, leader of the Quantum Nano-Optoelectronics research group, has been awarded his fifth PoC to date, the fourteenth award of this kind for

ICFO in the past ten years, for the project titled **POLARSENSE**. This project aims to develop an optical (infrared) gas sensor demonstrator chip based on a novel graphene electro-polaritonic platform.

Monitoring gases and particles through the use of smart sensors has a crucial role in a wide range of applications, from environmental control to breath analysis for diagnostics. With the information provided by these sensors, we are able to predict, prevent and act in potentially dangerous situations. In order for the data to be effectively transferred, the gas sensors must be integrated into portable devices with wireless connectivity, and must be miniaturized concurrently. To meet this requirement, the sensors must possess high sensitivity, selectivity, speed, ultra-low power consumption, and compatibility with silicon technology. However, currently no existing technology on the market fulfils all of these criteria.

The optical (infrared) gas sensor demonstrator chip based on a novel graphene electro-polaritonic platform that will be developed in this project is designed to address all of the aforementioned technical and commercial requirements. This will be demonstrated through its functionality and performance, with the capability of detecting multiple gases in a scalable, CMOS-compatible system with a sensitivity of 0.1 ppm, alongside specific optically active elements and an electrical detector all integrated within one single device. The result is a highly compact and efficient sensing platform that does not require an external photodetector. To achieve this, POLARSENSE will simulate, design, and fabricate a demonstrator chip in accordance with the specifications of our industrial partners, and test with a broadband infrared source to evaluate the performance.