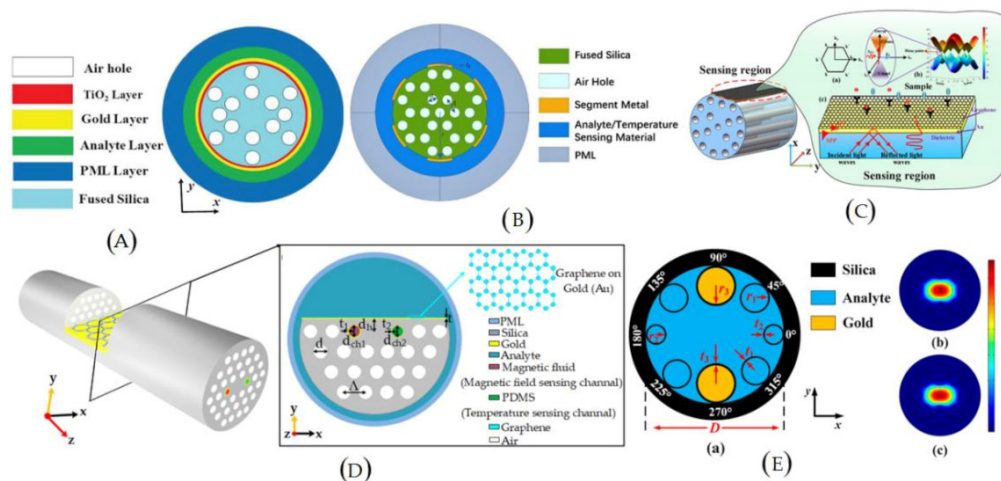


Optical Fiber, Nanomaterial, and THz-Metasurface-Mediated Nano-Biosensors: A Review

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Rationale and objective: The increasing use of nanomaterials and scalable, high-yield nanofabrication process are revolutionizing the development of novel biosensors. Over the past decades, researches on nanotechnology-mediated biosensing have been on the forefront due to their potential application in healthcare, pharmaceutical, cell diagnosis, drug delivery, and water and air quality monitoring. The advancement of nanoscale science relies on a better understanding of theory, manufacturing and fabrication practices, and the application specific methods.

Summary: In summary, the employability of optical fiber, nanomaterials, and metamaterials in biotechnology is revolutionizing the field of biosensing. This has widened the spectrum of sensing technology due to its smaller footprint, high accuracy, high throughput, and impressive detection limit. However, despite the high sensitivity and low detection limits, selectivity and cross-sensitivity are the underlying challenges of concern. These can be mitigated with the synthesis of new biorecognition, nanocomposite elements, efficient transducing devices, and signal processing algorithms. The benefits of optical transducers include the requirement of a small sample volume, fast detection, small response time, and repeatability.



Graphical summary: The example of using photonics crystal fiber for biosensors applications

Outcome: This review provides a comprehensive overview of the major scientific achievements in nano-biosensors based on optical fiber, nanomaterials and terahertz-domain metasurface-based refractometric, labelled and label-free nano-biosensors.

Related publications:

1. Rahman, B. M.A., Charusluk Viphavakit, Ratchapak Chitaree, Souvik Ghosh, Akhilesh K. Pathak, Sneha Verma, and Natsima Sakda. 2022. "Optical Fiber, Nanomaterial, and THz-Metasurface-Mediated Nano-Biosensors: A Review" *Biosensors* 12, no. 1: 42.
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