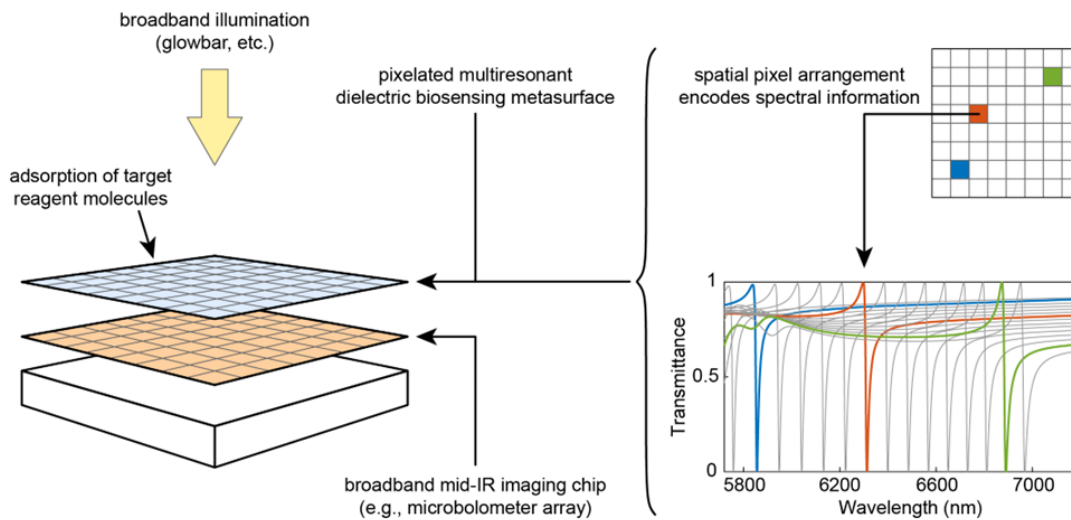


Multispectral dielectric metasurfaces for FTIR-less infrared spectroscopic biosensing



Working principle of the multispectral dielectric metasurface sensor. It consists of a pixelated dielectric metasurface placed on top of a broadband mid-infrared imaging chip. Individual pixels exhibit ultrasharp resonances, which can be spectrally tuned to cover a target wavelength range. Critically, spectral information from a narrow wavelength range is mapped onto the spatial pixel arrangement, allowing straightforward readout via the broadband imaging chip.

Ref. Nr

6.1749

Keywords

Biosensing, environmental monitoring, diagnostics, nanophotonics, chip-integrated mid-infrared spectroscopy

Intellectual Property

US 11,187,652 B2

Publications

Tillt A. et al, Science (2018)
[DOI: 10.1126/science.aas9768](https://doi.org/10.1126/science.aas9768)

Leitis A. et al, Advanced Materials (2021)
<https://doi.org/10.1002/adma.202102232>

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Description

The invention enables a method for measuring the infrared absorption fingerprint of various analytes with an integrated nanophotonic sensor chip and without the need for an FTIR spectrometer or tunable laser sources. To achieve this, the invention leverages a specially designed metasurface.

The device consists of a pixelated dielectric sensor metasurface placed on top of a broadband mid-infrared imaging chip (e.g., a microbolometer array). Possible target analytes include biomolecules, polymers, liquids - in general, the device could work with any analyte that can easily be brought into direct contact with the pixelated sensor metasurface.

Advantages

- High sensitivity
- Broad applications
- Chemically specific detection
- Capable of detecting mid-infrared molecular fingerprints without the need for spectrometry, frequency scanning, or moving mechanical parts
- Mid-IR imaging based biosensor

Applications

- Biosensing
- Environmental monitoring