

Microscale IR spectroscopy enabled by phase change materials and metasurfaces

May 14 2018

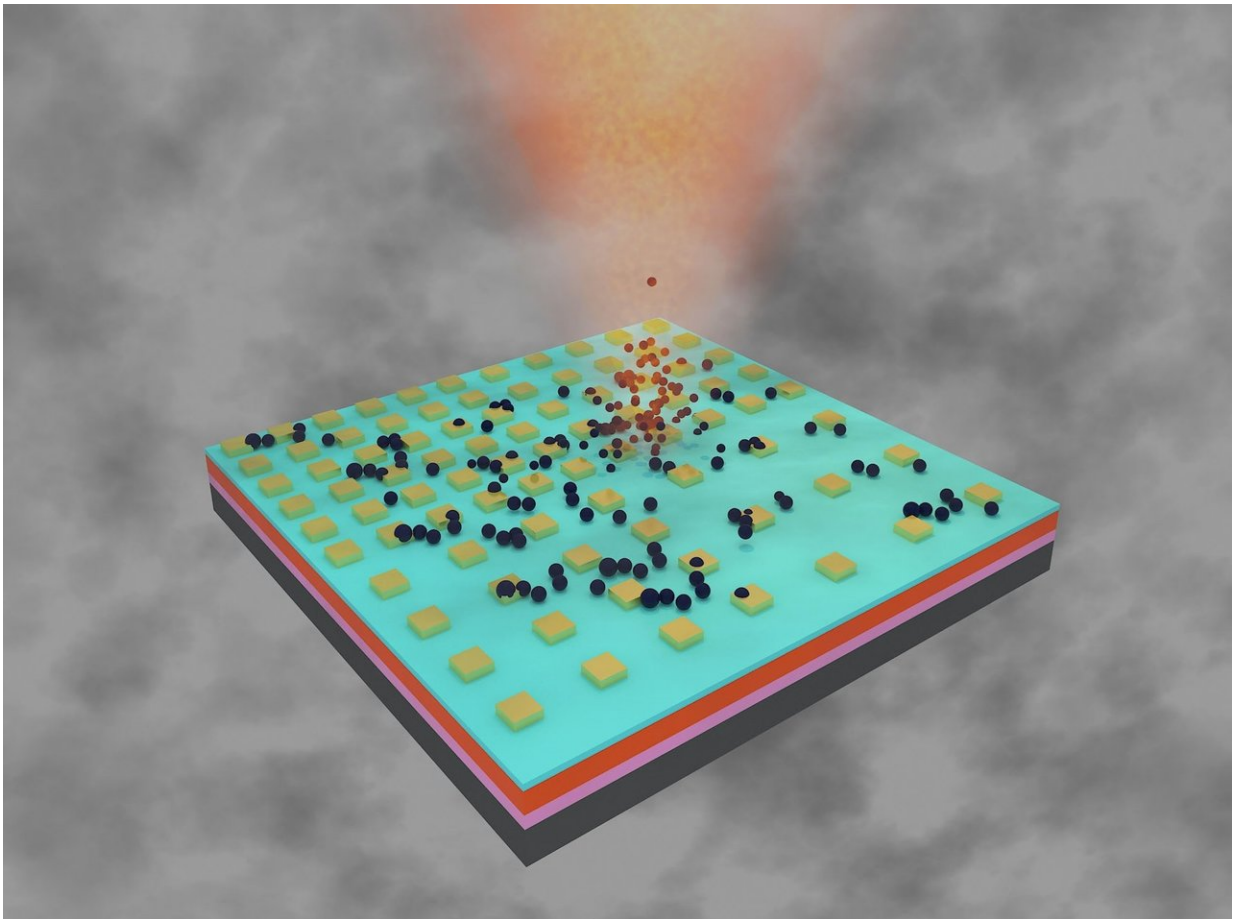


Illustration of the metasurface interacting with gas molecules. Credit: SUTD

The mid-infrared is an interesting part of the electromagnetic spectrum

composed of colours that cannot be seen by the human eye. Many chemical molecules resonate when illuminated by infrared light. This infrared resonance can then be used to identify or "fingerprint" the molecules. The infrared is, therefore, useful for a range of applications, including atmospheric pollution monitoring, detecting explosives and narcotics, measuring food quality, and many others. However, infrared optical components tend to be large, expensive, and non-tunable.

Researchers from the Singapore University of Technology and Design (SUTD) in collaboration with Dalian University of Technology (DUT) and the Singapore Synchrotron Light Source (SSLS), have demonstrated that tunable phase change materials, which are more typically found in data storage devices, can be used to tune the response of microscale infrared transmissive "metasurface" filters. The filters can be tuned across the broad band of frequencies in the mid-infrared spectrum where many pollutant gasses vibrate.

SUTD lead researcher, Assistant Prof Robert Simpson said: "These infrared filters are so small that they can be incorporated into a smart phone. This would allow you to measure the quality of the oil that has been used to fry your food, measure the air that you breathe, or to measure fluids that are expelled from your body to check the condition of your health."

This research was published in *Advanced Optical Materials*, which is renowned for publishing breakthrough interdisciplinary research that focuses on [light matter interactions](#).

More information: Weiling Dong et al, Tunable Mid-Infrared Phase-Change Metasurface, *Advanced Optical Materials* (2018). [DOI: 10.1002/adom.201701346](#)

Provided by Singapore University of Technology and Design

Citation: Microscale IR spectroscopy enabled by phase change materials and metasurfaces (2018, May 14) retrieved 3 May 2024 from

<https://phys.org/news/2018-05-microscale-ir-spectroscopy-enabled-phase.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.