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Efficient graphene acoustic plasmon resonator

A graphene-based device for ultrasensitive infrared spectroscopy and sensing

Technology No. 2019-223

IP Status: US Patent Issued / Patent No.: US 11,885,985 B2

Applications

- Photonics
- Molecular sensing

Technology Overview

Professor Sang-Hyun Oh's research group at the University of Minnesota has developed a strategy to achieve graphene-based optical and plasmonic resonators with dramatically improved absorption and conversion efficiency (measured absorption of 94%) by utilizing a two-stage coupling scheme and by monolithically integrating an optical spacer and a back reflector. The large absorption enabled by this resonator, in turn, allows ultrasensitive detection of mid-infrared absorption bands from submonolayer protein films, other biomolecules, thin films, using far-field Fourier-transform infrared measurements.

The high efficiency of this resonator is achieved by utilizing a two-stage coupling scheme: free-space light coupled to conventional graphene plasmons, which then couple to ultra-confined acoustic plasmons. This intellectual property includes method of fabrication of the resonator as well as designs for monolithically integrated optical spacers and reflectors that further boost the enhancement.

Phase of Development

TRL: 3-4
Prototype developed and tested in a lab environment.

Desired Partnerships

This technology is now available for:

- License
- Sponsored research
- Co-development

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Researchers

- **Sang-Hyun Oh, PhD,** Professor, Department of Electrical and Computer Engineering

References

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