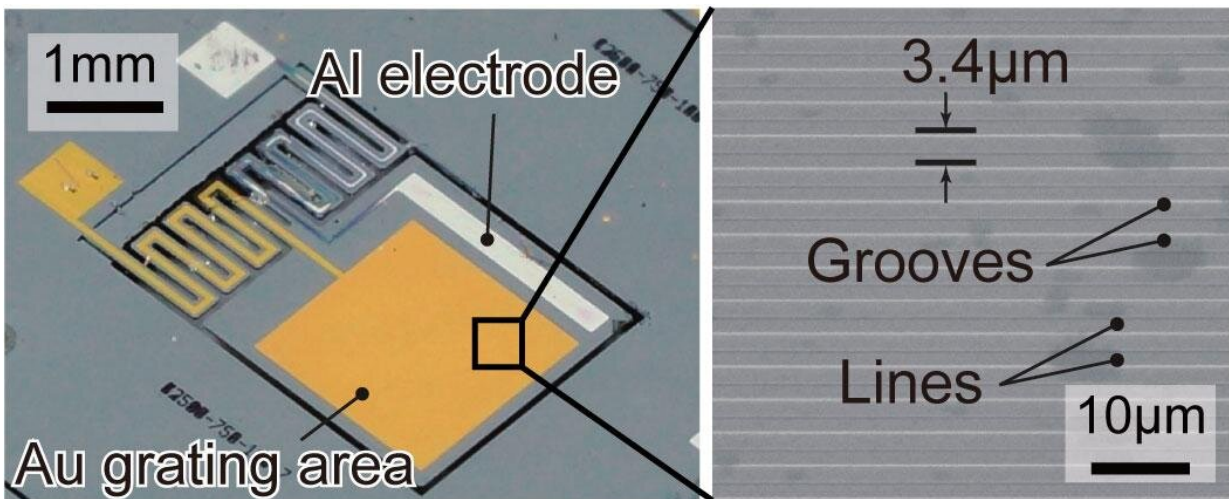


MEMS technology for fabricating plasmonic near-infrared spectrometers

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A gold diffraction-grating on a MEMS cantilever. Credit: University of Electro-Communications

Near-infrared spectroscopy provides absorption spectrum unique to substances so that discrimination of gas species becomes possible. Miniaturization of spectrometers is thus required to realize compact gas sensors for monitoring air quality in living spaces.

However, conventional near-infrared spectrometers have gratings to disperse [incident light](#) into different wavelengths, so long optical path lengths are required for spectroscopy, which is an obstacle for

miniaturization these devices.

Now, Oshita Masaaki and Kan Tetsuo at the University of Electro-Communications and collaborators have developed a gold diffraction-grating-type plasmonic photodetector on a MEMS—Micro Electro Mechanical Systems—deformable cantilever.

The device was fabricated using a bulk-micromachining technology using n-type silicon. A gold diffraction grating served the purpose as surface plasmon (SP) excitation. When the light is incident on the device, mechanical vibration of the cantilever dynamically changes the angle of incidence of the light, thereby alternating the SP coupling condition. Coupled to SPR, the [light energy](#) is transduced to photocurrent on the device.

Using an angular change of the cantilever over -21 - 21 degrees, optical spectrum in the near-infrared light was numerically retrieved by analyzing the time-varying photocurrent.

Highly miniaturized near-infrared spectrometers were realized, and are expected to lead to new small sized IoT sensors.

More information: Masaaki Oshita et al. Reconfigurable Surface Plasmon Resonance Photodetector with a MEMS Deformable Cantilever, *ACS Photonics* (2020). [DOI: 10.1021/acsp Photonics.9b01510](https://doi.org/10.1021/acsp Photonics.9b01510)

Provided by University of Electro Communications

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