課題番号　　:F-19-UT-0019
利用形態　　: 機器利用
利用課題名（日本語）　　:
Program Title (English)　　: Hot-electron photodetector with wavelength selectivity in near-infrared via Tamm plasmon
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キーワード／Keyword　　: Hot-electron, Tamm plasmon, 1D structure, near-infrared, photodetector
成膜・膜堆積

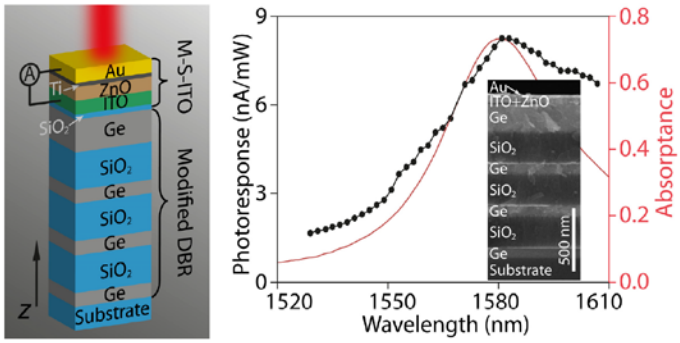
1. 概要（Summary）

Tamm plasmonic (TP) structures, consisting of a metallic film and a distributed Bragg reflector (DBR), can exhibit pronounced light confinement allowing for enhanced absorption in the metallic film at the wavelength of the TP resonance. This wavelength dependent absorption can be converted into an electrical signal through the internal photoemission of energetic hot-electrons from the metallic film. Here, by replacing the metallic film at the top of a TP structure with a hot-electron device in a metal–semiconductor–ITO (M–S–ITO) configuration, for the first time, we experimentally demonstrate a wavelength-selective photoresponse around the telecommunication wavelength of 1550 nm. Thus, we demonstrated a lithography-free means to realize wavelength-selective photodetection via Tamm plasmon and offers potential applications in the monitoring of individual wavelength for the first time.

2. 実験（Experimental）

【利用した主な装置】
高密度汎用スパッタリング装置
LL 式高密度汎用スパッタリング装置
電子顕微鏡
4 インチ高真空 EB 蒸着装置
【実験方法】
Au, Ge, SiO_2 のターゲットで製膜

3. 結果と考察（Results and Discussion）



The first experimental results of TP coupled hot-electron photodetector.

A maximum photoresponse of 8.26 nA mW^{-1} was achieved at the TP resonance wavelength of 1581 nm. The absorption peak of the photodetector was monitored by a change of the photoresponse at zero bias. As a result, a wavelength-selective photodetection was demonstrated in the C- and L-band of telecommunication wavelengths (from 1529 to 1607 nm).

4. その他・特記事項（Others）

なし

5. 論文・学会発表（Publication/Presentation）

Wang, Z., et al. Hot-electron photodetector with wavelength selectivity in near-infrared via Tamm plasmon. *Nanoscale*, 11(37), 17407-17414, 2019.

6. 関連特許（Patent）

なし