

課題番号 : F-21-HK-0030
利用形態 : 機器利用
利用課題名(日本語) :
Program Title (English) : Developing a electrochemical SERS measurement system to investigate the distinct spectral characteristics of water oxidation intermediates
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キーワード/Keyword : Modal strong coupling, Surface-enhanced Raman Scattering、成膜・膜堆積

1. 概要(Summary)

We aimed at to fabricate modal strong coupling structures that composed of gold and silver alloy nanostructures showing localized surface plasmon and TiO₂ thin film/Au-film nanocavity (AATA) for versatile surface-enhanced Raman scattering (SERS) chips and investigate the distinct spectral characteristics of water oxidation intermediates.

2. 実験(Experimental)

【利用した主な装置】

ヘリコンスパッタリング装置 (MPS-4000C1/HC1), 超高分解能走査型電子顕微鏡 (SU8230), 原子層堆積装置 (ALD) SUNALE-R), 多元スパッタ装置 (QAM-4-ST),

【実験方法】

Au-film was deposited on the SiO₂ substrate by Helicon sputtering, and TiO₂ film was fabricated by atomic layer deposition (ALD) system. Au and Ag alloy nanoparticles (Au/Ag-NPs) with different sizes were fabricated on a TiO₂-thin-film /Au-film by vacuum evaporator, and then annealed in N₂ atmosphere at 600°C for 10 h.

3. 結果と考察(Results and Discussion)

Scanning electron microscope (SEM) images of Au/Ag-NPs on TiO₂/Au-film/SiO₂ is shown in Figure 1. The size of Au/Ag-NPs was regulated by changing the thickness of deposited Au and Ag, which will determine the plasmon wavelength. Modulate the cavity by changing the thickness of TiO₂ film, when the cavity resonated with plasmon

of Au/Ag-NPs, we can get the tuning condition of the AATA structure. The absorption of AATA was shown in Figure. 2.

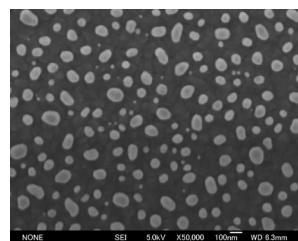


Fig. 1 SEM images of Au/Ag-NPs on TiO₂ film/Au-film.

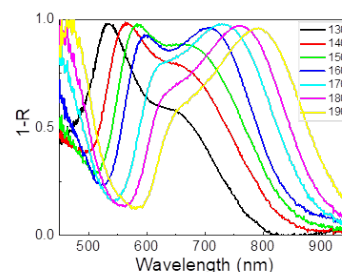


Fig. 2 Absorption spectra of AATA with different TiO₂ thickness.

4. その他・特記事項(Others)

・参考文献

Y. Suganami, T. Oshikiri, X. Shi, H. Misawa, *Small*, 60 (2021) 18438–18442.

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・関連文献

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5. 論文・学会発表(Publication/Presentation) なし

6. 関連特許(Patent) なし