課題番号 : F-20-HK-0022
利用形態 : 共同研究
利用課題名（日本語） :
Program Title (English) : Study the Plasmonic Topological Photonics using Photoemission Electron Microscopy
利用者名（日本語） :
Username (English) : Qiuchen Yan[1)]
所属名（日本語） :
Affiliation (English) : 1) Institute of modern optics, college of physics, Peking University
キーワード／Keyword : Nanochain, Plasmon, topological photonics, Photoemission electron microscopy、形状・形態観察

1. 概要（Summary）

We demonstrate how the polarization of incident light can affect the position of the generated plasmonic topological edge states by fabrication Su-Schrieffer-Heeger (SSH) topological nanochains.

2. 実験（Experimental）

【利用した主な装置】

超高精度電子ビーム描画装置(ELS-F125-U), ヘリコンスパッタリング装置 (ULVAC MPS-4000C1/HC1), 高分解能電界放射型走査型電子顕微鏡 (JEOL JSM-6700FT), 電子ビーム蒸着装置(EB-580S)

【実験方法】

Topological nanochains composed of gold nanoparticles were fabricated on the substrate of Indium tin oxide (ITO) by using EBL and Helicon Sputtering. 50-PA current was used in EBL, 2-nm adhesion layers and 30-nm gold nanoparticles were used in Helicon Sputtering. The gold nanoparticles were arrayed as SSH chains with diameter of 180nm and gap of 40nm. The topological nanochains were observed by SEM and Photoemission Electron Microscopy (PEEM). The polarization of incident light affected which side the edge state can be generated.

3. 結果と考察（Results and Discussion）

Figure 1 demonstrates the SEM image of the topological SSH nanochains with the diameter of 180nm and the gap between the nearest nanoparticles of 40nm. Furthermore, the observed plasmon hotspots excited by femo-second laser with PEEM indicated that the incident light with different polarization can determine the position of the generated topological states. To be specific, if the polarization direction of incident light is parallel to the x axis, the topological edge state occur on the rightmost nanoparticle, while if the polarization direction of incident light is parallel to the y axis, the topological edge state occur on the leftmost nanoparticle.

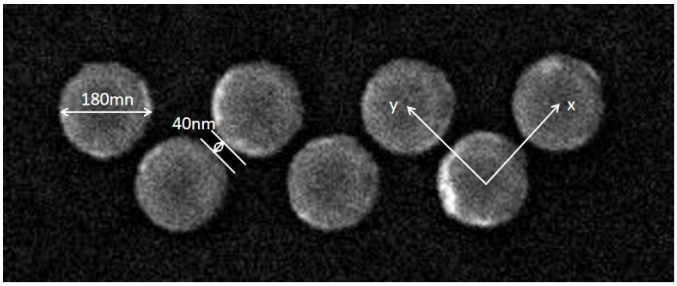

Figure 1 Schematic of topological SSH chains composed of gold nanoparticles with diameters of 180nm and gaps of 40 nm. x and y indicate the polarization direction of the incident light.

4. その他・特記事項（Others）

Main collaborators: H. Misawa (RIES-Hokkaido University).

・参考文献:

[1] Sinev I S *et al*., Nanoscale 7, (2015);
[2] Wang L *et al*., Optics express 27, (2019).

5. 論文・学会発表（Publication/Presentation）

なし

6. 関連特許（Patent）

なし