

課題番号 : F-18-HK-0030
 利用形態 : 共同研究
 利用課題名(日本語) :
 Program Title (English) : Fabrication of Metalens Array for Hyper spectrum
 利用者名(日本語) :
 Username (English) : Jia-Wen Chen¹⁾, Yu-Han Chen¹⁾, Ding-Ping Tsai^{1,2)}
 所属名(日本語) : 1) 国立台湾大学物理学部, 2) 中央研究院応用科学研究中心
 Affiliation (English) : 1) Department of Physics, National Taiwan University, Taiwan, 2) Research Center for Applied Sciences, Academia Sinica, Taiwan
 キーワード/Keyword : Electron beam lithography, Metasurface, リソグラフィ・露光・描画装置

1. 概要(Summary)

Metasurfaces can shape the electromagnetic field by manipulating the phase, amplitude as well as polarization in a nanoscale. Such promising approaches render them great features and functionality in a variety of applications. Metalenses composing of a well-designed array of nanoantennas on a surface can be used to manipulate the incoming light wavefront.^[1] In this report, we fabricate a series of nanoantenna arrays for the application of achromatic planar lens.

2. 実験(Experimental)

【利用した主な装置】

Electron Beam Lithography (Elionix ELS-130HM), Helicon Sputtering (ULVAC MPS-4000C1/HC1), SEM (JEOL JSM-6700FT), Dry etching (RIE-101iPH SAMCO)

【実験方法】

A well-designed array of nanoantennas was fabricated by electron beam lithography (EBL) exposure, sputtering, lift-off, several hard mask transfer and etching processes.

3. 結果と考察(Results and Discussion)

We employed the integrated-resonant unit element (IRUE) in metasurfaces with smooth and linear phase dispersion combining with geometric phase. Figure 1a shows optical image the a 5×4 arrays of the metalens, consisting nanoantennas with carefully designing and arranging of the IRUEs. Figure 1b show the SEM image corresponding to the optical image. Figure 1c and

1d are the zoom-in SEM images at the center of single metalens. As the SEM images shown, sophisticated nanoantennas was successfully fabricated. We will apply these well-designed dielectric nanoantennas to the applications of light field sensor and spectral camera.

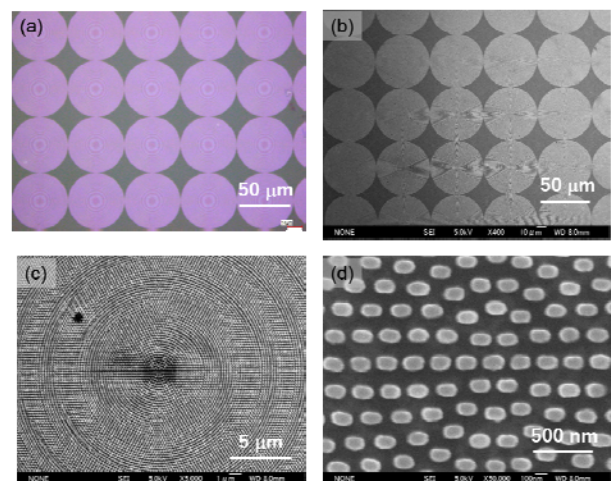


Figure 1. (a) Optical image of the IRUE array. (b) SEM image of the IRUE array. (c)-(d) Zoom-in SEM images of the center.

4. その他・特記事項(Others)

・参考文献

[1] S. Wang, et al., *Nat. Nanotechnol.*, 13, 227-232 (2018).

・共同研究者: X. Shi, K. Ueno, Q. Sun, T. Oshikiri, and H. Misawa

5. 論文・学会発表(Publication/Presentation)

なし

6. 関連特許(Patent)

なし