

課題番号 : F-19-HK-0024
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
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1. 概要(Summary)

Metalenses have a great ability to manipulate the properties of an incoming light wavefront by the optical nanoantennas on the surface. We use GaN-based integrated-resonant unit elements to demonstrate a metalens working in the visible region in transmission way. Through the structural design of dispersion-engineered metalens, numerous applications are expected to export in light-based and optical technologies.

2. 実験(Experimental)

【利用した主な装置】

超高速スキャン電子線描画装置 (Elionix ELS-130HM), 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), ICP 高密度プラズマエッチング装置 (RIE-101iPH SAMCO)

【実験方法】

We designed an array of nanoantennas and 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)

The metalens consist of a large number of optical nanoantennas capable of focusing the incoming light wave-front by the GaN-based integrated-resonant unit elements with smooth and linear phase dispersion combining with geometric phase. The optical images of the fabricated metalens sample is shown in Figure 1. The images

show the very high performance after EBL and lift-off process. The image is the patterned Cr layer (hard mask) and the diameter of this metalens is 1 mm. We will apply these fabricated dielectric metalens to realize the applications of bio-imaging.

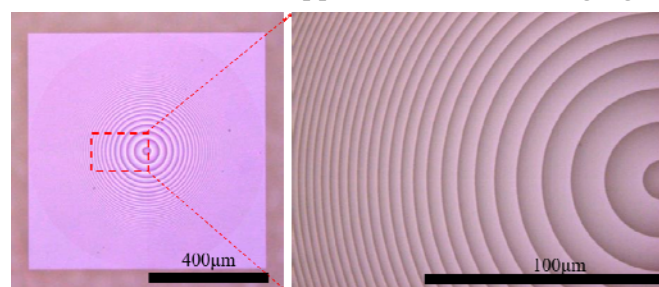


Figure 1, The optical image of the fabricated metalens after lift-off process.

4. その他・特記事項(Others)

・参考文献

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

[2] R. J. Lin, et al., *Nat. Nanotechnol.* 14, 227-231 (2019)

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5. 論文・学会発表(Publication/Presentation)

なし

6. 関連特許(Patent)

なし