

課題番号 : F-19-WS-0040
 利用形態 : 機器利用
 利用課題名(日本語) : 導波路形状の変更による SOI プラットフォームの検知能力の改善
 Program Title (English) : Improvement of sensing capability on SOI platform by modifying the waveguide shape
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 キーワード/Keyword : リソグラフィ・露光・描画装置、膜加工・エッチング、導波路、SOI

1. 概要(Summary)

Necessity for current electronics to be in future electronic devices is to be small as possible and effective as possible. This should be done which small steps as possible and cheap as possible. Which is why we turned to Bragg grating and changed its waveguide shape to be small as possible. Compared to the device in ref. [1] we do rigorous simulations for optimizations and more compact format.

2. 実験(Experimental)

【利用した主な装置】

電子ビーム描画装置、電子ビーム蒸着装置

【実験方法】

The first task had been to set up the limits of our fabrications. Based on EB lithography development results the smallest slot sizes we can fabricate are close to 30nm as seen in Fig 1. This size however will become bigger due to side angle issue after etching.

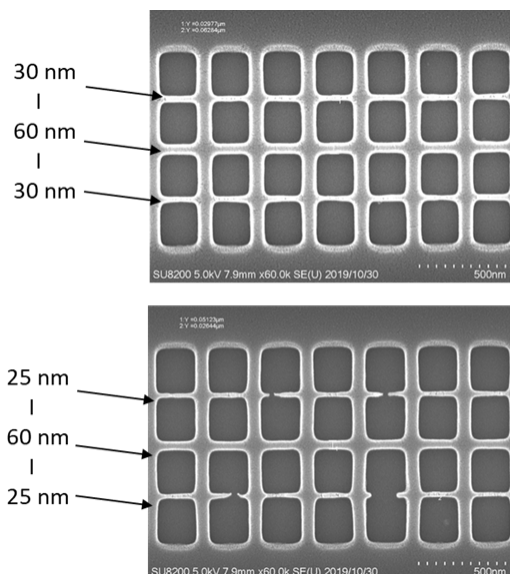


Fig. 1 SEM image of the EB limitations on SOI.

3. 結果と考察(Results and Discussion)

Fabricated device works quite efficiently worked efficient but the ER was rather small, only 9dB. For more efficient result we increased period count and obtained much better results as shown in Figs. 2 and 3, but loss is still high. Further optimization is needed and modulation possibility is needed to consider. In measurements we see however some spurious FP ripples due to device short length [2].

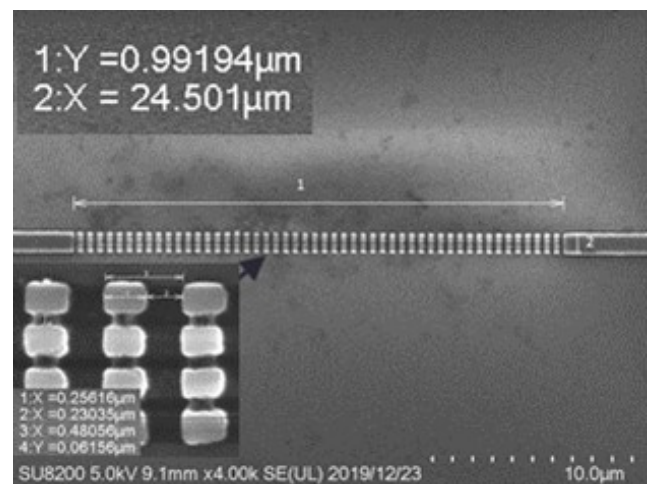


Fig. 2. Fabricated sensor SEM image.

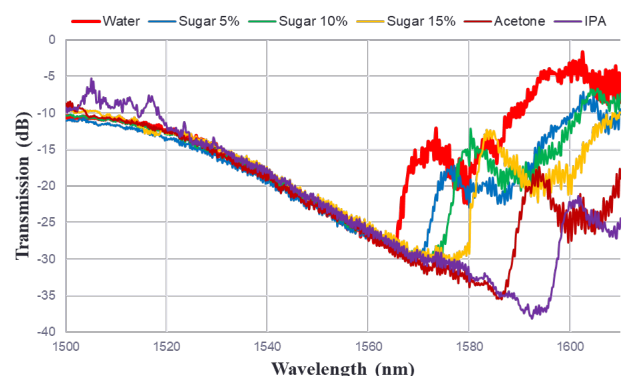


Fig. 3. Fabricated device measurement results.

4. その他・特記事項(Others)

・参考文献

[1] E. Luan et al., “Label-free biosensing with a multi-box sub-wavelength phase-shifted Bragg grating waveguide”, Biomed. Opt. Express, Vol. 10, issue 9, pp. 4825-4838, 2019.

[2] Q. Zhong et al., “Focusing-curved subwavelength grating couplers for ultra-broadband silicon photonics optical interfaces”, Opt. Express, Vol. 22(10), ppt. 18224-31, 2014.

・関連文献

(1) 24th Microoptics conference, November 17~20, 2019.

(2) 80th JSAP Autumn meeting, September 18-21, 2019.

5. 論文・学会発表(Publication/Presentation)

なし。

6. 関連特許(Patent)

なし。