

課題番号 : F-17-UT-0158  
利用形態 : 機器利用  
利用課題名(日本語) : グラフエンを用いたシリコンフォトニクスの研究  
Program Title (English) : Graphene-based Silicon Photonic Devices  
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## 1. 概要(Summary)

In Yamashita-Set Lab we are working on high speed on chip-optical devices, integrated with graphene. Final goal is the fabrication and testing of high speed graphene modulators and photodetectors on silicon waveguides.

## 2. 実験(Experimental)

### 【利用した主な装置】

・高速大面積電子線描画装置(F7000s)

### 【実験方法】

In the Takeda cleanroom, we use F7000s e-beam machine and negative and positive resists to fabricate silicon waveguides of sub-micron sizes. Figure 1 shows the SEM image of the waveguide and Figure 2 shows the image of the grating coupler.

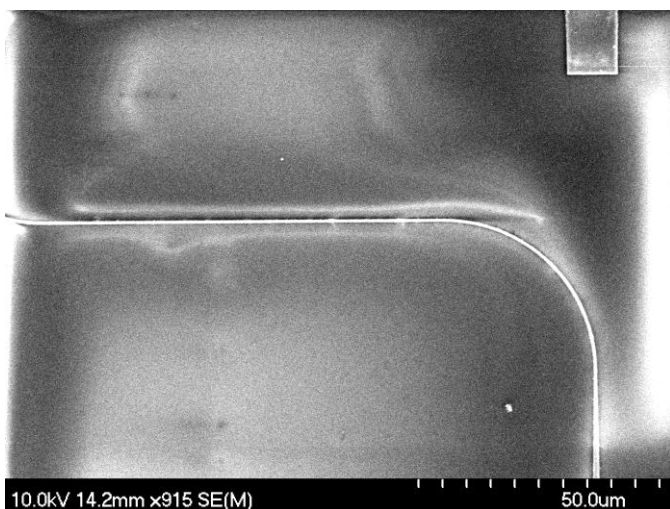


Figure 1 Waveguide region of the fabricated device

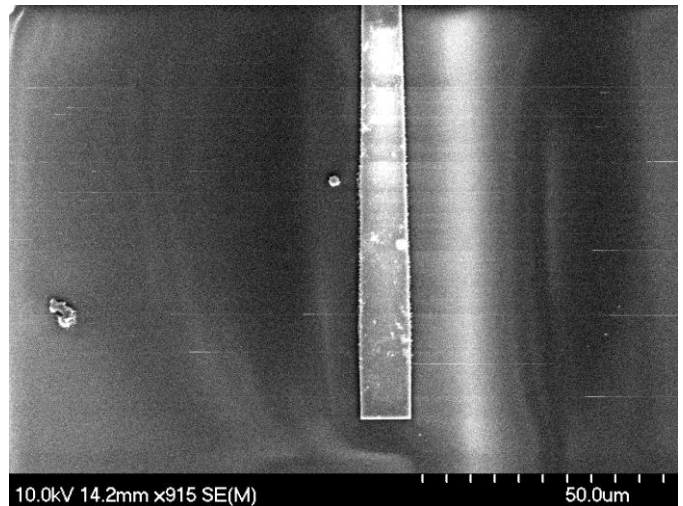


Figure 2 Grating coupling region (tapered waveguide)

Both SEM images have been taken using the SEM in the Takeda CR, and the coupling efficiency has been relatively high after testing, around 10dB loss per grating coupler.

The waveguides have been fabricated by using the DRIE etcher available in the Takeda CR. The etching was conducting after e-beam exposure and resist development.

## 3. 結果と考察(Results and Discussion)

We are relatively new to the Takeda CR so for now we have only fabricated silicon waveguides. However, our future plan is to utilize the machines in the CR to build entire graphene based devices. These include CMP for waveguide planarization, sputtering, thermal evaporation, and others.

## 4. その他・特記事項(Others)

None

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

None

## 6. 関連特許(Patent)

None