

課題番号 : F-15-UT-0125  
利用形態 : 機器利用  
利用課題名(日本語) : シリコンフォトニクスにおける Midex(中位屈折率差系)AWG の試作  
Program Title (English) : Fabrication of an array waveguide grating for mid-index contrast Si Photonics  
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### 1. 概要(Summary)

I aim to develop an integrated photonic circuit platform on bulk Silicon wafer based on mid-refractive index contrast optics for Si Photonics for the future dense wavelength-division multiplexing system. This research project will study electro-optical properties of the CMOS compatible material of GeSi, SiN, SiO<sub>x</sub>N<sub>y</sub>, and SiO<sub>2</sub> on bulk Si wafer for future Telecom systems.

### 2. 実験(Experimental)

#### 【利用した主な装置(apparatus)】

高速大面積電子線描画装置 (ADVANTEST F5112-VD01)、汎用 ICP エッチング装置(CE-300)

#### 【実験方法(method)】

Variable shape projection Electron-beam lithography (F5112-VD01) allowed me to obtain large and highly-resolute structures rapidly. I used the PVD sputtering machine, to study Silicon nitride materials deposited at low-temperature for wavelength -division multiplexing system. I also employed CE-300 ICP-RIE to pattern the device. During all the process, scanning electron microscope (SEM) and optical microscope were widely used to observe the progress.

### 3. 結果と考察(Results and Discussion)

Fabrication of an array waveguide grating using Takeda cleanroom facilities.

### 4. その他・特記事項(Others)

none

### 5. 論文や学会発表等(Publications/Presentation)

1)“Development of silicon nitride arrayed waveguide grating by physical vapor deposition at room temperature”, P. Chaisakul, K. Wada et al.,IEEE 12th International Conference on Group IV Photonics (GFP), Vancouver, Canada, Aug. 26 –28, 2015.

2)“Ge/SiGe multiple quantum wells for photonic integrated circuits on silicon”(invited), P. Chaisakul, K. Wada et al., Photonics North 2015, Ottawa, Ontario, Canada, June 9-11, 2015.

3)“A study of physical vapor deposition silicon nitride for dense wavelength division multiplexing on silicon wafer”, P. Chaisakul, K. Wada et al., SPIE Microtechnologies, Barcelona, Spain, May 4 – 6, 2015.

### 6. 関連特許(Patent)

none