

課題番号 : F-20-UT-0091
利用形態 : 機器利用
利用課題名(日本語) : グラフェンを用いたシリコンフォトニクス研究
Program Title (English) : Graphene research for Silicon Photonics
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キーワード/Keyword : グラフェン、形状・形態観察、フォトニクス、モード同期レーザー

1. 概要(Summary)

Our main research focuses on high speed chip-optical devices and laser systems, integrated with graphene. The final goal is the fabrication and testing of high-speed graphene modulators and photodetectors on silicon waveguides. We are also using graphene devices for laser mode-locking to generate ultra-short optical pulses.

2. 実験(Experimental)

Research activities in TakedaCR are restricted due to COVID-19 for most of this year. We have done some experiments for the fabrication of graphene devices using the TakedaCR.

【利用した主な装置】(Main Equipment Used)

形状・膜厚・電気特性評価装置群

簡易電子顕微鏡 (日立 TM-3030Plus)

【実験方法】

Single-layer Graphene transfer from polymer to CaF₂/Al₂O₃ substrate for laser mode-locking experiment in the mid-infrared region.

The process is performed in the clean chamber in CR1 in Takeda Sentanchi SCR, The Univ. Tokyo.

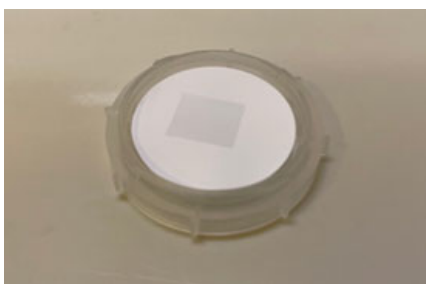


Fig.1 Single-layer Graphene-on polymer

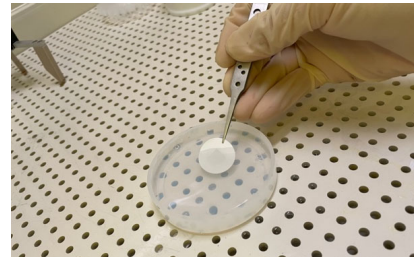


Fig. 2. Wet graphene-transfer process

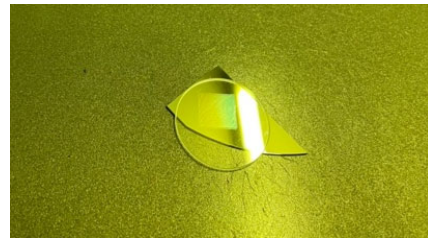


Fig. 3. Hot plate annealing.

The processes are shown in Fig.1-3. The graphene layer is released into deionized water with sacrificial layer on it. Then, the transfer is finished by introducing the desired substrate from below. The residual water between graphene and substrate is removed by annealing on hot plate at 150 degC for 1 hour.

3. 結果と考察(Results and Discussion)

This experiment told us the wet transfer in deionized water for graphene from polymers to glass. This substrate and technology will be fully used for high output by multiple LD excitations and conversion to infrared such as Ti:Al₂O₃.

4. その他・特記事項(Others)

なし

5. 論文・学会発表(Publication/Presentation)

なし

6. 関連特許(Patent)

なし