

課題番号 : F-21-KT-0043
 利用形態 : 機器利用
 利用課題名(日本語) : ナノスケール共振器の作製と機械特性評価
 Program Title (English) : Fabrication and electromechanical study of nanoscale resonators
 利用者名(日本語) : ハネルジー アミット
 Username (English) : A. Banerjee
 所属名(日本語) : 京都大学大学院工学研究科
 Affiliation (English) : Graduate school of Engineering, Kyoto University
 キーワード/Keyword : リソグラフィ・露光・描画装置、グラフェン、N&MEMS

1. 概要(Summary)

Nanomechanical resonator devices can perform as powerful sensors of various physical quantities. Our objective is to develop new methods of fabricating nanoscale suspended devices for their application as nanoscale electromechanical gas sensors. Graphene, a material made of a monolayer of carbon, is an ideal material for developing such devices; however, fabricating such devices from an unconventional material is challenging. In this research, we aimed to develop a fabrication process of suspended graphene drum resonators.

2. 実験(Experimental)

【利用した主な装置】

レーザー直接描画装置、両面マスクアライナー、高速高精度電子ビーム描画装置

3. 結果と考察(Results and Discussion)

First, a series of micron-scale (dia. 1 – 50 μm) holes were patterned on the device layer of an SOI wafer using photolithography and DRIE process. A thin layer of Au was deposited on the sample. Then, Monolayer graphene was successfully transferred over the holes using a conventional PMMA transfer method. A schematic diagram and a FESEM image of the suspended graphene drum is presented in Fig. 1. Later, a new set of device with a local bottom gate is attempted. In this process, the SOI wafer is strategically etched to create an electrode under the suspended graphene (Fig. 2). Also, the transferred graphene is being

attempted to be etched to form ribbons, which will create individual suspended graphene devices. We plan to induce and detect resonance vibration in the suspended graphene ribbons using the bottom gate. Thereafter, we will use the fabricated devices for gas sensing.

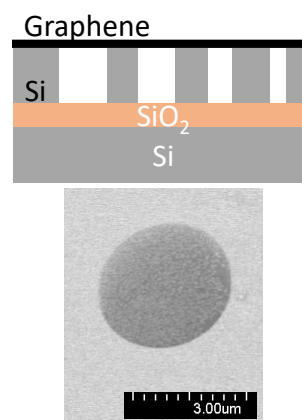


Fig. 1: Suspended graphene drums, schematic (above) and FESEM image (below).

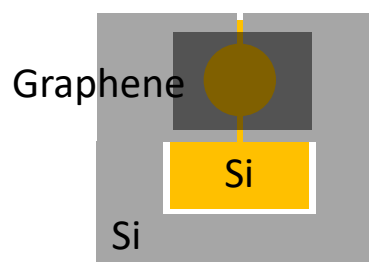


Fig. 2. Schematic diagram of suspended graphene drum with a bottom gate.

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。