

課題番号 : F-19-UT-0128  
利用形態 : 機器利用  
利用課題名(日本語) : ウルトラクリーン単一カーボンナノチューブトランジスタの作製プロセスの研究  
Program Title (English) : Fabrication of ultraclean single carbon nanotube transistors  
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キーワード/Keyword : 成膜・膜堆積、カーボンナノチューブ、ナノトランジスタ

### 1. 概要(Summary)

The aim of this project is to fabricate ultra-clean carbon nanotube (CNT) devices for single CNT THz spectroscopy experiments. The growth of the CNT is performed at the end of process at 900°C on a pre-patterned Silicon chip with Ti/Pt contact. The step of Ti/Pt deposition is made at Takeda cleanroom

### 2. 実験(Experimental)

#### 【利用した主な装置】

LL 式高密度汎用スパッタリング装置

#### 【実験方法(experimental method)】

For the electrical contact of CNTs, the deposition recipe used is the number 14: an Ar plasma for 10s at 100W followed by a Ti deposition for 60 s at 200 W and then the Pt deposition for 300 s at 200 W. Targeting 10 nm of Ti and 50 nm of Pt.

### 3. 結果と考察(Results and Discussion)

Thanks to the Takeda cleanroom facility, we could perform Ti/Pt deposition, which are crucial for our project. Figure 1 shows Ti/Pt electrodes before the CNT growth. And the Figure 2 the same electrode after the growth with a suspended CNT between them.

The first results are very encouraging, the Ti/Pt electrodes are still good after the growth. We succeed to have one Carbon Nanotube contacted. But unfortunately there was a shortcut because the SiO<sub>x</sub> oxide we deposited was leaking so we couldn't

perform any experiments with those sample. It is still an ongoing work.

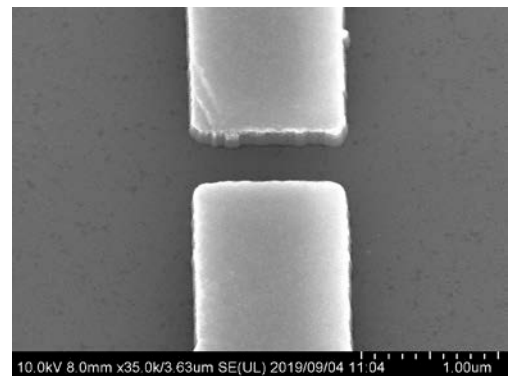


Fig. 1 SEM image of the Pt nanogap electrode fabricated on a sputtered SiO<sub>2</sub> layer.

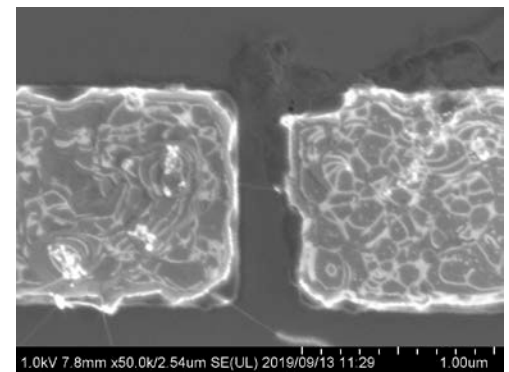


Fig. 2 SEM image of the junction after CNTs were grown. A single CNT bridges the 2 electrodes.

### 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