

課題番号 : F-19-UT-0079  
利用形態 : 機器利用  
利用課題名(日本語) : 分子による架橋カーボンナノチューブの光物性チューニング  
Program Title (English) : Molecular tuning of the optical properties in air-suspended carbon nanotubes  
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キーワード/Keyword : カーボンナノチューブ、有機分子吸着、リソグラフィ・露光・描画装置

## 1. 概要(Summary)

We investigate the tuning effect on the optical properties of air-suspended carbon nanotubes adsorbed with organic molecules.

## 2. 実験(Experimental)

### 【利用した主な装置】

高速大面積電子線描画装置、クリーンドラフト潤沢超純水付、高速シリコン深掘りエッチング装置、ステルスダイサー

### 【実験方法】

Trenches on the Si wafer are patterned by electron-beam lithography and subsequently formed after ICP etching. Afterwards, individual trenched chips are obtained from the Si wafer by stealth dicing.

Air-suspended carbon nanotubes are grown on such trenched chips via chemical vapor deposition. Afterwards, phenanthrene is deposited onto the nanotubes via thermal evaporation. The optical properties of such nanotubes are characterized by a

home-built photoluminescence system.

## 3. 結果と考察(Results and Discussion)

Both excitation and emission energies of the air-suspended carbon nanotubes adsorbed with phenanthrene exhibit a redshift. Tuning of the optical properties is attributed to the dielectric screening effect.

## 4. その他・特記事項(Others)

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

[1] Z. Li, K. Otsuka, and Y. K. Kato, Molecular tuning of the optical properties in air-suspended carbon nanotubes, RAP Symposium, Wako, Japan, December 9-10.

[2] Z. Li, K. Otsuka, and Y. K. Kato, Molecular tuning of the optical properties in air-suspended carbon nanotubes, The All-RIKEN Workshop 2019, Wako, Japan, December 5-6, 2019.

[3] Z. Li and Y. K. Kato, Single-carbon-nanotube photonics and optoelectronics, 7th RIKEN-NCTU Symposium on Physical and Chemical Sciences, Hsinchu, Republic of China, October 4-5, 2019.

## 6. 関連特許(Patent)

なし。

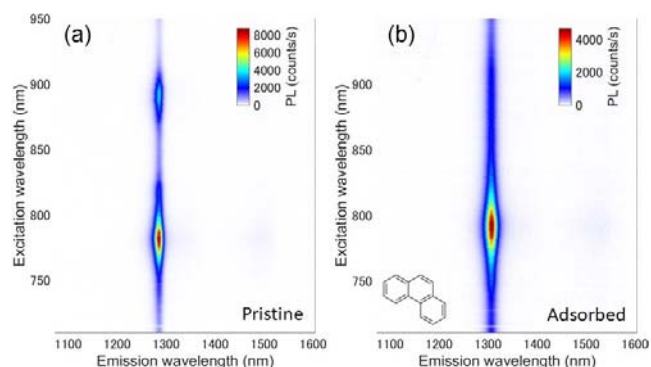


Fig. 1 Photoluminescence excitation spectra of a suspended carbon nanotube (a) before and (b) after adsorption of phenanthrene, respectively.