マテリアル先端リサーチインフラ利用報告書
ARIM User's Report

【Release：2024.07.25】　【Update：2024.03.21】

課題データ / Project Data

課題番号 Project Issue Number	23UT1132
利用課題名 Title	Optical properties of suspended 1D-2D heterostructure materials
利用した実施機関 Support Institute	東京大学 / Tokyo Univ.
機関外・機関内の利用 External or Internal Use	外部利用/External Use
ARIM半導体基盤PF 関連課題 Related to ARIM-SETI	指定なし / No Designation
横断技術領域 Cross-Technology Area	加工・デバイスプロセス/Nanofabrication
重要技術領域 Important Technology Area	次世代ナノスケールマテリアル/Next-generation nanoscale materials
キーワード Keywords	電子線リソグラフィ/ EB lithography,膜加工・エッチング/ Film processing/etching,ダイシング/ Dicing,ナノチューブ/ Nanotube

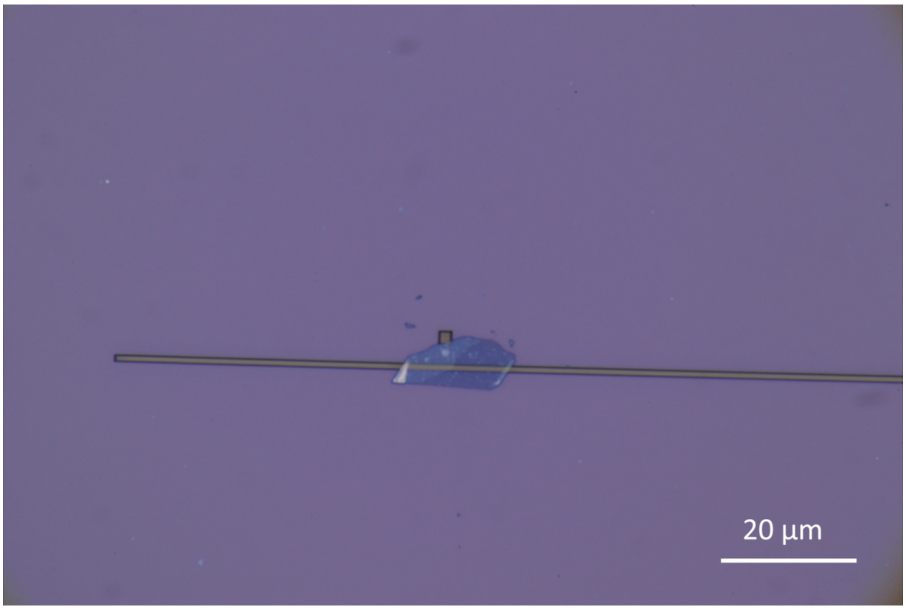
利用者と利用形態 / User and Support Type

利用者名（課題申請者） User Name (Project Applicant)	加藤 雄一郎
所属名 Affiliation	理化学研究所
共同利用者氏名 Names of Collaborators Excluding Supporters in the Hub and Spoke Institutes	Yih-Ren Chang,Chee Fai Fong,Wataru Terashima
ARIM実施機関支援担当者 Names of Supporters in the Hub and Spoke Institutes	
利用形態 Support Type	機器利用/Equipment Utilization

利用した主な設備 / Equipment Used in This Project

利用した主な設備 Equipment ID & Name	UT-503：超高速大面積電子線描画装置 UT-604：高速シリコン深掘りエッチング装置 UT-900：ステルスダイサー

報告書データ / Report

概要（目的・用途・実施内容） Abstract (Aim, Use Applications and Contents)	We use the apparatus to create trenches on silica substrates for suspended carbon nanotube (CNT) growth. The suspended CNT will be grown by CVD method and then applied to 1D-2D heterostructure formation.
実験 Experimental	EB lithography was applied to define trench patterns. Trenches on silicon oxide substrate is created by inductively coupled plasma etching. Second EB lithography was applied to define the deposition patterns of metal catalyst. After metal catalyst deposition, CNTs are grown by a CVD method. Finally, 2D materials are transferred on CNT to form 1D-2D heterostructure.
結果と考察 Results and Discussion	The trenches and patterns for catalyst deposition are clearly defined and created, which contribute to the CVD growth of CNTs. The 1D-2D heterostructures were fabricated by 2D material transfer, as shown in Figure 1. Further characterization of these 1D-2D heterostructures will be conducted through optical approaches, such as PL measurements.
図・表・数式 1 Figures, Tables and Equations 1	 Figure 1 The OM image of 1D-2D heterostructure.
その他・特記事項（参考文献・謝辞等） Remarks(References and Acknowledgements)	The main user of this report, Yih-Ren Chang, is supported by postdoctoral fellowship of JSPS.

成果発表・成果利用 / Publication and Patents

DOI（論文・プロシーディング） DOI (Publication and Proceedings)	
口頭発表、ポスター発表および、その他の論文 Oral Presentations etc.	
特許出願件数 Number of Patent Applications	0件

特許登録件数 Number of Registered Patents	0件