

# 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 : 2024.06.17]

### 課題データ / Project Data

課題番号 Project Issue Number	23AT5030
利用課題名 Title	ナノ結晶材料の合成
利用した実施機関 Support Institute	産業技術総合研究所 / AIST
機関外・機関内の利用 External or Internal Use	内部利用 (ARIM事業参画者) / Internal Use (by ARIM members)
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	計測・分析/Advanced Characterization 物質・材料合成プロセス/Molecule & Material Synthesis
重要技術領域 Important Technology Area	革新的なエネルギー変換を可能とするマテリアル/Materials enabling innovative energy conversion 高度なデバイス機能の発現を可能とするマテリアル/Materials allowing high-level device functions to be performed
キーワード Keywords	量子効果デバイス / Quantum effect device, 太陽電池 / Solar cell


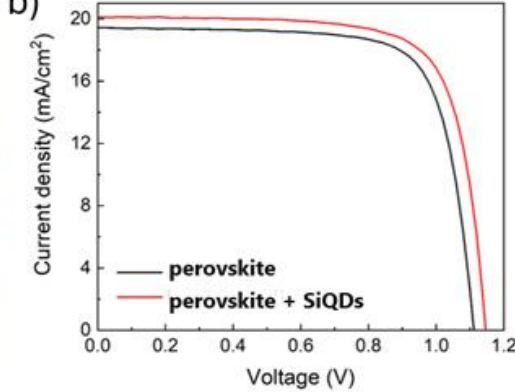
### 利用者と利用形態 / User and Support Type

利用者名 (課題申請者) User Name (Project Applicant)	松井 卓矢
所属名 Affiliation	産業技術総合研究所 再生可能エネルギー研究センター
共同利用者氏名 Names of Collaborators Excluding Supporters in the Hub and Spoke Institutes	Vladimir Svrcek
ARIM実施機関支援担当者 Names of Supporters in the Hub and Spoke Institutes	松崎弘幸, 永井秀和
利用形態 Support Type	技術補助/Technical Assistance

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

利用した主な設備 Equipment ID & Name	AT-503 : 可視-近赤外過渡吸収分光装置 (VITA)
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## 報告書データ / Report

<p>概要 (目的・用途・実施内容) Abstract (Aim, Use Applications and Contents)</p>	<p>To enhance the interaction with the host perovskite matrix and solar cell performance, we modify the surface and shape of both the perovskites and silicon quantum dots. Our approach involves utilizing femtosecond laser (fs laser) at wavelengths of 800 and 400 nm, varying the intensity as a key parameter.</p>
<p>実験 Experimental</p>	<p>One representative experiment outcome is depicted in FIG. 1a below, obtained by focusing the fs laser beam at a wavelength of 400 nm on the solution containing SiQDs. The quantum dots (QDs) are dispersed in various solutions such as water, octane, and hexene.</p>
<p>結果と考察 Results and Discussion</p>	<p>The laser-treated SiQDs are subsequently introduced to perovskites to fabricate solar cells. Figure 1b illustrates typical J-V curves of solar cells based on perovskite, with and without laser-treated SiQDs. It's evident that there's an enhancement in the IV characteristics upon the introduction of laser-treated SiQDs.</p>
<p>図・表・数式 1 Figures, Tables and Equations 1</p>	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>a)</p>  </div> <div style="text-align: center;"> <p>b)</p>  </div> </div> <p>Fig 1a) shows the laser treatment of SiQDs by focusing the fs laser beam at a wavelength of 400 nm on the solution containing SiQDs. Fig 1b) illustrates typical J-V curves of solar cells based on perovskite, with and without laser-treated SiQDs.</p>
<p>その他・特記事項 (参考文献・謝辞等) Remarks(References and Acknowledgements)</p>	

## 成果発表・成果利用 / Publication and Patents

<p>DOI (論文・プロシーディング) DOI (Publication and Proceedings)</p>	
<p>口頭発表、ポスター発表 および、その他の論文[1] Oral Presentations etc.</p>	<p>Svrcek, Vladimir; McDonald, Calum; Padmanaban, Dilli Babu; McGlynn, Ruairi; Kambley, Ankur; Alessi, Bruno; Mariotti, Davide; Matsui, Takuya, "Benefits of Surface Engineered Silicon Quantum Dots in Formamidinium Lead Iodide Perovskite Solar Cells", 2023 IEEE 50th Photovoltaic Specialists Conference (PVSC), 2023.6</p>
<p>特許出願件数 Number of Patent Applications</p>	<p>0件</p>

<b>特許登録件数</b> <b>Number of Registered Patents</b>	0件
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