

大学名	大阪大学		
University	Osaka University		
外国人研究者	ダビッド・メラニー・ヤダオ		
Foreign Researcher	David Melanie Yadao		
受入研究者	ディニョ・ウィルソン・アジェリコ	職名	准教授
Research Advisor	DIÑO, Wilson Agerico	Position	Associate Professor
受入学部/研究科	工学研究科		
Faculty/Department	Engineering		

<外国人研究者プロフィール/Profile>

国籍	フィリピン
Nationality	Filipino
所属機関	デ・ラ・サール大学
Affiliation	De La Salle University
現在の職名	准教授
Position	Associate Professor
研究期間	2018年8月30日 ~ 2018年11月17日 (80日間)
Period of Stay	80 days (August 30, 2018 - November 17, 2018)
専攻分野	ナノサイエンス・ナノテクノロジー
Major Field	Nanoscience/Nanotechnology



ダビッド・メラニー・ヤダオ / David, Melanie Yadao

<外国人研究者からの報告/Foreign Researcher Report>

①研究課題 / Theme of Research

Computational Materials Design for Efficient Sources of Energy

The modern technology considers alternate sources of energy that will not deplete non-renewable sources of energy and protect the environment. Some of the properties being considered here are the defects and porosity of materials. In addition, we also examined the mechanism in joining dissimilar materials by high-power laser. This is to create different materials with tailor-engineered properties such as high-temperature resistance in one area, good corrosion resistance in another. Structures may need toughness or wear resistance in one area combined with high strength in another location.

②研究概要 / Outline of Research

The research topics include defects and porosity of Silicon for photovoltaic systems. We investigated on the light absorption, dielectric performance, and tuning the energy gap to enhance the optical properties of porous Silicon.

In addition, we also examined the importance of oxygen in joining dissimilar materials by high-power laser. The strength and adhesion of polymer material on metal joined by laser was examined and clarified.

③研究成果 / Results of Research

During the period of my stay, here are activities and results of our research:

1. Discussed and conducted consultation with collaborators within Osaka University and other universities and institutions.
2. Mentored students in the laboratory with their research topics and in writing papers. We are finalizing two papers for publication.
3. Presented in conferences and seminars.
4. Conducted seatworks and a lecture in undergraduate and graduate school classes in Osaka University.
5. Discussed with Osaka University EVP for Globalization for research and education such as shared laboratories and double degree programs with De La Salle University – Philippines.

④今後の計画 / Further Research Plan

We plan to continue communicating and investigating the materials designed for clean and sustainable energy. There are still areas to explore in the emerging materials for different functionalities. We will also consider other alternatives such as hydrogen-based economy and biofuels from microalgae.

<受入研究者からの報告/Research Advisor Report>

①研究課題 / Theme of Research

効率的かつポータブルなエネルギー源のための材料設計/Materials Design for Efficient and Portable Energy Sources

The Research Fellow's PhD Thesis title was "Theoretical Investigations on the Possible Nanoscale Systems for Electronic and Magnetic Devices." After returning to the home country, the Research Fellow has been focusing on applying computational materials design techniques to meet the current need for alternative energy sources and more efficient means of utilizing them. The Research Fellow has also been doing active collaboration with experimentalists.

②研究概要 / Outline of Research

Due to the limited amount of time, the Research Fellow decided to focus on two tasks for this particular visit/stay. First, the scientific/research aspect, to design a material that would enable efficient use of energy sources, and another to allow for portability of energy sources. Second, the social aspect, to initiate and follow through with the collaborations initiated between the Philippines and Japan. To gain insights to achieve the first part, the Research Fellow contacted and discussed with several researches in Japan, presented in conferences, and used the students as bouncing wall for ideas. For the second part, the Research Fellow proactively contacted university administrators and key persons for discussions and commitments.

③研究成果 / Results of Research

For the Research aspect, the Research Fellow considered introducing pores/defects to tailor the electronic and optical properties of Si, and in turn enabling solar cells absorb light more efficiently. The Research Fellow considered utilizing the naturally occurring oxide layers to realize strong joints between dissimilar materials, e.g., engineering plastics and stainless steel. The Research Fellow benefitted from in-depth/long discussions with experimentalists, and the experimentalist in turn come to appreciate the design techniques introduced. For the Social aspect, the Research Fellow initiated actions to further strengthen collaborations and facilitate exchanges between the host university and the home university.

④今後の計画 / Further Research Plan

This visit provided the Research Fellow not only with the opportunity to do good Science, but also to exercise the role of a leader, an educator, and a facilitator. We are in the process of writing the papers resulting from the studies made during this visit. The Research Fellow has to also see that the programs initiated would see through their fruition. To ensure this, we will keep in touch and also proactively find other means to sustain these activities, viz., collaboration and exchange.



セミナーの様子/
Seminar @Applied Physics, Osaka University, 31 August 2018



明石高専で開催されたComputational Materials Design for Energy Utilization Workshopの集合写真/
Computational Materials Design for Energy Utilization Workshop Group Picture@National Institute of Technology - Akashi College, 5 October 2018