Web 掲載用

SD4709

※弊会記入欄

（学校用）

様式 A-1

(FY2025)

2025年 10月 7日

サイエンス・ダイアログ　実施報告書

1. 学校名: 奈良県立青翔高等学校・青翔中学校

2. 講師氏名: Dr. Bhawna(Ms.)

3. 講義補助者氏名: 松島 航暉 様

4. 実施日時: 2025年 10月 7日 （火） 15:30 ～ 17:30

5. 参加生徒: 2年生 19人（合計 19人）
   備考:理数科の生徒 希望者

6. 講義題目: Perovskites - The Puzzle Pieces of Tomorrow's Technology

7. 講義概要:
   ・講師の自己紹介、出身国の紹介
   ・研究者としてのキャリアについて
   ・研究の概要について
   ・質疑応答

8. 講義形式:
   ☑対面 ・ □オンライン （どちらか選択ください。）
   1) 講義時間 60分　　質疑応答時間 30分

   2) 講義方法（例:プロジェクター使用による講義、実験・実習の有無など）
   プロジェクター使用による講義
   実験・実習: 無

   3) 事前学習
   ☑有 ・□ 無 （どちらか選択ください。）
   使用教材: 自作プリント教材の配布

9. その他特筆すべき事項:

For Web posting

SD4709
※弊会記入欄

Form B-2
(FY2025)
Must be typed

Date（日付）15/10/2025
（Date/Month/Year：日/月/年）

Activity Report -Science Dialogue Program-
（サイエンス・ダイアログ 実施報告書）

- Fellow's name（講師氏名）: Bhawna （ID No. P24340 ）

- Name and title of the lecture assistant（講義補助者の職・氏名）
Koki Matsushima (Master student, M2)

- Participating school（学校名）: Nara Prefectural Seisho High School

- Date （実施日時）07/10/2025 （Date/Month/Year: 日/月/年）

- Lecture title（講義題目）:
Perovskites: The Puzzle Pieces of Tomorrow's Technology

- Lecture format（講義形式）:
◆☒Onsite ・ ☐Online (Please choose one.)（対面 ・ オンライン）（(どちらか選択ください。)）
◆Lecture time（講義時間） 50 min（分）, Q&A time（質疑応答時間） 10 min（分）
◆Lecture style（ex.: used projector, conducted experiments）
（講義方法（例：プロジェクター使用による講義、実験・実習の有無など））
I used a projector for my presentation, showing illustrations and videos, and explained everything using simple analogies from everyday life.

- Lecture summary（講義概要）: Please summarize your lecture within 200-500 words.
I began the lecture by sharing my background – where I am from, how I became interested in science and research, and the journey I took to achieve that goal. I talked about coming to Japan, joining my research group at Kyoto University, and the great opportunity provided by JSPS that helped me pursue my scientific dreams.

After this brief introduction, I introduced the students to my research focus on a fascinating material called perovskite, a rapidly growing field in modern technology. Perovskites are being used in many exciting applications such as solar cells, LEDs (light-emitting diodes), X-ray detectors, lasers, and imaging devices. Scientists around the world are amazed by how versatile and powerful these materials can be.

To make the topic more relatable, I explained the concept of conductivity and introduced semiconductors through everyday examples, highlighting why semiconductors are important. I then focused on solar cells - how they work, what absorber materials are, and how perovskites can help create cheaper, lighter, and flexible solar panels, even those that could fit on windows, cars, or clothes.

I also shared the story behind perovskites: how a scientist named Gustav Rose discovered a new mineral, calcium titanate ($CaTiO_3$), in the mountains of Russia, and named it perovskite in honor of the Russian mineralogist Lev Perovski. Later, scientists found that by replacing calcium and titanium with other elements, they could create many different kinds of perovskites with unique properties, so much that almost every element in the periodic table can form a perovskite!

To help the students visualize, I explained the concept of crystals using LEGO blocks as an example of building units, and introduced the crystal structure of halide perovskites. I showed interactive videos and images, and explained how perovskites are made in the laboratory as single crystals, nanoparticles, and thin films, and how they look under electron microscopes.

I demonstrated the concept of light absorption by comparing it to how sunscreen absorbs UV light and converts it into a safer form of energy, like heat. This analogy helped introduce the idea of electrons moving between energy levels, just like climbing stairs from one floor to another requires energy. Similarly, electrons need energy to jump to higher levels, which explains absorption and emission of visible light in perovskites used for solar cells and LEDs.

Toward the end, I talked about what the future holds for these amazing materials and encouraged the students to explore science themselves, emphasizing the global opportunities awaiting young minds. I also shared photos showing that research life is not only about experiments, it includes enjoyable moments like playing sports, having group dinners, and building teamwork, creativity, and vision.

I concluded the lecture with a message:
“Science is not just a career – it’s an adventure of curiosity, creativity, and impact. Anyone who loves to ask ‘Why?’ can be a scientist!”

◆Other noteworthy information（その他特筆すべき事項）:
It is a wonderful program that gives students a fresh perspective on the developments in the modern scientific world and motivates them to take an interest in science. I tried to make the content as simple and easy to understand as possible; however, due to time constraints, I could not spend much time explaining some of the technical terms. In addition, a few students may have faced language barriers. It would also have been helpful to have some prior information about their curriculum, so that I could have tailored my talk more closely to their level and background.

For Web posting

SD4709

※弊会記入欄

- Impressions and comments from the lecture assistant（講義補助者の方から、本プログラムに対する意見・感想等がありましたら、お願いいたします。）: 同行者として今回のプログラムに参加し、高校生が興味を持って研究の話を聞いてくれることは新鮮で刺激的だった。一方で、どうしても専門的な話であるために後半になるにつれてちぎれてしまう子が散見され、話を聞く側もかなり大変そうだと思った。外国人 PD が主にやり取りをしていた関係で、どのような内容が適切か、また高校側でどのような事前準備がなされているかの共有が十分でなかったために、このようなことが起こったと感じた。同行者の力不足も痛感しているが、双方（聞く高校生・話す PD）にとってより有用な機会となうような情報共有の方法が確立できるとこのプログラムの魅力が増すのではないかと感じた。