

様式 A-1
(FY2025)

2025年 12月 5日

サイエンス・ダイアログ 実施報告書

1. 学校名: 秋田県立横手高等学校
2. 講師氏名: Vishal KACHWAL
3. 講義補助者氏名: 石井 邦和
4. 実施日時: 2025年 12月 2日 (火) 13:30 ~ 15:00
5. 参加生徒: 2年生 35人、 年生 人、 年生 人 (合計 35人)
備考:(例:理数科の生徒) 理数科の生徒
6. 講義題目: Glowing Chemistry:The Cracking Secret of Molecular Crowds
7. 講義概要: 先生の出自とどうやって現在の研究にたどり着いたのかを紹介しいた後、発光に関していろいろな例を挙げ説明していただいた。英語だけでなく日本語の表記もありわかりやすい内容であった。
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 65 分 質疑応答時間 25 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。
 - 3) 事前学習
有 ・ 無 (どちらか選択ください。)
使用教材:
9. その他特筆すべき事項: 今回は発光に関連する内容が中心であったが、化学の様々な分野を紹介していただいた。高校では、無機化学と有機化学しか触れる機会がないこともあり、生徒は多岐にわたる分野を知り、関心をもつ生徒がでてくるなど大変貴重な機会となった。

Form B-2
(FY2025)
Must be typed

Date (日付)
08/12/2025

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): Vishal Kachwal (ID No. P24410)

- Name and title of the lecture assistant (講義補助者の職・氏名)

Mr KuniKazu Ishii (Master)

- Participating school (学校名): Akita Prefectural Yokote High School

- Date (実施日時): 02/12/2025

- Lecture title (講義題目):

Glowing Chemistry: The Cracking Secret of Molecular Crowds

- 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) 75 (分), Q&A time (質疑応答時間) 25 (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))

used projector

- Lecture summary (講義概要): Please summarize your lecture within 200-500 words.

The lecture “Glowing Chemistry: The Secret of Molecular Crowds” introduced students to the excitement of chemistry by linking everyday experiences with molecular behaviour. It began with a brief reflection on my journey—from early education in India to research in Oxford and now in Japan as a JSPS Fellow—showing how science grows from curiosity and a willingness to explore. Chemistry was then explained as the study of matter and its changes, using examples like cooking, colours, soaps, batteries, and medicines to show how deeply it is woven into daily life. Students also learned how chemistry blends with physics, biology, materials science, and AI, forming the base of many modern technologies.

The talk then moved to light and luminescence, describing how molecules interact with light and emit it. Stories such as Herschel’s observation of quinine and Stokes’ discovery of the Stokes shift helped students understand how fluorescence was first recognized. The Jablonski diagram provided a simple picture of how molecules absorb energy, relax, and emit light. This led to a discussion on why molecules sometimes shine brightly and sometimes lose their glow. Students learned about quenching effects and Aggregation-Caused Quenching (ACQ), which

often weakens traditional dyes in the solid state. This introduced Aggregation-Induced Emission (AIE), a phenomenon where molecules glow more when they come together because their motions are restricted. These AIE-active materials show strong, stable emission, making them useful for sensing, imaging, and photonic applications.

Building on this, the lecture connected to the 2025 Nobel Prize in Chemistry, which highlighted the importance of Metal–Organic Frameworks (MOFs). MOFs were introduced as crystalline materials made from metal nodes and organic linkers, offering extremely high porosity and tunable structures. These materials can store, capture, separate, and react with molecules, functioning like molecular sponges. The slide emphasized that this development created an entirely new branch of materials chemistry, showing students how fundamental discoveries can transform technology.

Finally, advanced topics from my own research were introduced, including AIE-MOFs, polymersomes, and AIE-based microfibers, demonstrating how combining AIE behaviour with porous frameworks leads to bright, stable, and customizable materials. Recent progress on tunable and white-light emitting microfibers illustrated how engineered structures translate into real-world applications. The session concluded by encouraging students to stay curious and open to new ideas, with the reminder that scientific discovery often begins with observing something simple and asking “why?”

◆Other noteworthy information (その他特筆すべき事項):

This was my first time visiting a Japanese high school, and it was a very unique and memorable experience. The school environment was impressive, and the students showed strong scientific interest and understanding. Although many were a little shy to ask questions, they raised thoughtful points—such as whether electricity can be generated simply by walking or movement without an external power source. This led to a discussion on energy-harvesting concepts, where I introduced triboelectric nanogenerators, and I was amazed to hear that some students were already working on similar project ideas. The slides in both the language and support from a native lecture assistant helped communications, and the session created a valuable opportunity for students to encounter advanced chemistry topics in an accessible way. Overall, I was truly impressed by their curiosity and enthusiasm, and it was a rewarding experience to interact with such motivated young learners.

- 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。):

Explaining advanced chemistry topics in English to high school students can be challenging, but the students made a sincere effort to follow the lecture and actively engage with the material. The slides with both English and Japanese explanations, greatly supported their understanding. Since opportunities to learn science directly in English or to be exposed to cutting-edge chemistry are limited at the high school level, I believe this session provided an excellent and meaningful experience for them.

From the lecturer’s perspective as well, the chance to interact with motivated students and answer their questions offered valuable insight into how young learners think about science.

For Web posting

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Overall, it was a rewarding session for everyone involved, and I feel it successfully encouraged the students to explore scientific topics with curiosity and confidence.

