SD 4446
※弊会記入欄

（学校用）

様式 A-1
(FY2023)

6 年 1 月 15 日

サイエンス・ダイアログ　実施報告書

1. 学校名・実施責任者氏名: 愛知県立岡崎高等学校・足立輝明

2. 講師氏名: Dr. David Weston BURKE

3. 講義補助者氏名: なし

4. 実施日時: 6 年 1 月 12 日（金） 16 : 00 ～ 18 : 00

5. 参加生徒: 1 年生 13 人、 2 年生 23 人、 3 年生 0 人（合計 36 人）
   備考: 文理混合

6. 講義題目: 錯体ソフトマテリアルの創生

7. 講義概要: Nacl を用いた結晶化の実験とそのメカニズム

8. 講義形式:
   1) 講義時間 90 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＋実験演習

   3) 事前学習
      ㊒ ・ 無 （どちらかに〇をしてください。）
      使用教材 講師からの講義概要をあらかじめ渡して、読ませておく。

9. その他特筆すべき事項:
   難しい化学の内容を実験を用いて身近に感じさせ、さらに的確な解説で興味深く伝えてもらいました。

Form B-2
(FY2023)
Must be typed

Date（日付）
15/01/2024 （Date/Month/Year：日/月/年）

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

- Fellow's name（講師氏名）: David Weston Burke （ID No. P22034 ）

- Name and title of the accompanying person（講義補助者の職・氏名）
Not applicable

- Participating school（学校名）: Aichi Prefectural Okazaki High School

- Date （実施日時）: 12/01/2024 （Date/Month/Year:日/月/年）

- Lecture title（講義題目）:
Design and Applications of Nanoporous Materials

- 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） 80 min（分）, Q&A time（質疑応答時間） 40 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））
PowerPoint presentation, followed by hands-on experiments for the high school students

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

My lecture was divided into two parts. First, I briefely introduced my hometown and the United States, and I discussed my motivations for pursuing a PhD degree in chemistry and a postdoctoral research fellowship in Japan. Second, I provided an overview of the Furukawa Group's field of research. The Furukawa Group's research is broadly focused on designing and synthesizing nanoporous materials for a variety of applications, including molecular separations, gas storage, catalysis, drug delivery, and sensing. To communicate these possibilities to the high school students, I first defined the term "nanoporous material," as "a molecule or collection of molecules (material) containing molecule-sized (nanoscale) empty space (pores) within its structure" and described why we are interested in building porous materials (possibilities include selective molecular recognition, transport, and separation). I then described the design principles for assembling porous materials. Most importantly, the geometry of the molecular building blocks should be carefully selected such that their condensation can afford a geometrically-defined pore. Furthermore, the molecular building blocks should be rigid rather than flexible, as flexible monomers will create materials more susceptible to pore collapse. I also described the three types

of bonds that can be used to construct porous materials (covalent bonds, coordination bonds, and intermolecular forces), and what the differences are between them. Finally, I described three examples of how porous materials have been designed to solve real-world problems in molecular separations, catalysis, and hydrogen gas storage. Once the PowerPoint presentation was finished, the students performed two experiments. The first involved growing a single crystal of sodium chloride, as crystallizing small molecules is one method to assemble a porous material through intermolecular forces. After this experiment was completed, we gave each student a pack of nanoporous silica gel beads and asked them to immerse the beads into water. Though the beads appear solid and transparent to the naked eye, they contain 2-3 nanometer pores filled with air. When water enters the pores, the trapped air is displaced, such that the beads begin to bubble vigorously. This activity is therefore an excellent way for the students to visuallize nanoscale porosity. Once the experiments were finished, we gave the students 10 minutes to come up with some questions about the lecture and discuss them in small groups. We then allowed them to ask their questions for 30 minutes before concluding the lecture.

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

Overall, the lecture went went very smoothly, so I don't have any other noteworthy information to share.

- Impressions and comments from the accompanying person（講義補助者の方から、本事業に対する意見・感想等がありましたら、お願いいたします。）:

Not applicable