SD4331

※弊会記入欄

**（学校用）**

**様式 A-1**

**(FY2023)**

2023 年　6 月　23 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: 澤田　更紗

2. 講師氏名: Dr. David Weston BURKE(Mr.)

3. 講義補助者氏名: 吉田亮平

4. 実施日時: 2023 年 6 月　13 日 （ 火 ）　14:20 ～ 16:10

5. 参加生徒:　2 年生 39 人、　年生 人、　年生 人（合計 人）
   備考: 理数探究科の生徒

6. 講義題目: 段階的自己集合化を用いた光制御型錯体ソフトマテリアルの創成

7. 講義概要:
   ナノ多孔質細胞には構造上の細孔があり、それを用いることで分子を結合させたり、分子を変換したり、分子を分断することができる。

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、クリスタル生成の実験、乾燥剤を使った実験

   3) 事前学習
      (有) ・ 無 （どちらかに〇をしてください。）
      使用教材　講師の先生のパワーポイント

9. その他特筆すべき事項:

SD4331

※弊会記入欄

SD 4331
※弊会記入欄

**Form B-2**
**(FY2023)**
**Must be typed**

Date（日付）
19/06/2023 （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）
Ryohei Yoshida

- Participating school（学校名）: Fukui Prefectural Wakasa High School

- Date （実施日時）: 13/06/2023 （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） 90 min（分）, Q&A time（質疑応答時間） 20 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.

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 four

examples of how porous materials have been designed to solve real-world problems in molecular separations, pollutant remediation, catalysis, and hydrogen gas storage. At the end of each section of the presentation, Ryohei gave a brief summary in Japanese to help the students to follow along. Once the PowerPoint presentation was finished, we opened the floor for questions, which lasted for ~20 minutes. At the end of the Q&A time, we had the students perform 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 completed, we gave the students one more chance to ask questions, then concluded 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。）:

研究室に所属してから日が浅い自分にとって、この事業への参加は、自らの研究室の研究内容を改めて理解できる貴重な機会になりました。同時に、化学に興味を持っている高校生たちの学びの一助となれたことが非常に嬉しいです。意見は特にありません。手続きに至るまで、特に問題はありませんでした。