SD

※弊会記入欄

（学校用）

様式 A-1

(FY2023)

年　　月　　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：　学校法人池田学園　池田高等学校　　小田　紘史

2. 講師氏名：　Dr. Animesh PAL (Mr.)

3. 講義補助者氏名：　なし

4. 実施日時：　令和5年　7月　14日（金）　10:40 ～ 12:25

5. 参加生徒：　高校2年生　22人、　高校1年生　17人、　中学3年生　11人（合計　29人）

   備考：（例：理数科の生徒）

   ※うちオンラインによる聴講生は、高校1年生12人、中学3年生9人（いずれも富士見丘中学高等学校の生徒）

6. 講義題目：　冷暖房応用のための六方晶窒化ホウ素とイオン液体を添加したハイブリッド吸着剤の開発

7. 講義概要：出身国の紹介、自身の研究内容に関する講義等

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　80 分　　質疑応答時間　20 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、一部生徒はオンラインで講義に参加

   3) 事前学習

      （有）・ 無（どちらかに〇をしてください。）

      使用教材　講師が事前に作成したアブストラクト

9. その他特筆すべき事項：

10.

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Form B-2
(FY2023)
Must be typed

Date（日付）
18/07/2023 （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）: Animesh Pal （ID No. P21043 ）

- Name and title of the accompanying person（講義補助者の職・氏名）
No

- Participating school（学校名）: Ikeda High School, Kagoshima (Onsite) and Fujimigaoka High School for Girls, Tokyo (Online)

- Date （実施日時）: 14/07/2023 （Date/Month/Year:日/月/年）

- Lecture title（講義題目）: Biomass-derived Activated Carbon for Cooling/Heating Applications

- 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） 95 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））
  Used projector and online facilites

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

At the beginning of my lecture, I talked about myself, my country Bangladesh, and the similarity and dissimilarity between Japan and Bangladesh. After that, I talked about my motivation to pursue higher studies and to become a scientist. And then I gave a lecture on my research activities in a simple understandable way.

The research on adsorption cooling and heat pump system got momentum after observing the worldwide energy crisis along with the obligation of international protocols which limits the production and utilization of CFCs (chlorofluorocarbons) and HCFCs (hydrochlorofluorocarbons) as refrigerants. Adsorption heat pump (AHP) system is found to be a safe and viable alternative to the mechanical vapor compression system because of the following advantageous features: (i) ability to use effectively low-grade waste heat or solar heat of temperature below 100°C as the driving heat source, (ii) it can utilize natural and/or alternative refrigerants having zero or negligible global warming potential, (iii) no moving parts, (iv) does not require electricity other than the heat transfer fluid pumps and electromagnetic valves, and (v) require negligible maintenance. However, their widespread adoption is hindered by

advancements in the adsorbent material, which is one of the key elements of this system. Among the various adsorbents studied so far, activated carbon (AC) has been proven potential adsorbents for AHP applications due to its high surface area and pore volume. Activated carbon (AC) is an advanced form of charcoal and has diverse applications, including adsorption heat pumps, radionuclides adsorption, wastewater treatment, gas storage & separation, CO_2 capture & storage, volatile organic compounds (VOCs) removal, heavy metal removal, industrial pollution control, and so on.

Biomass precursors are an excellent choice for preparing AC because it has high carbon content, a different type of microstructures, abundantly available, relatively low-cost, and prepared AC possesses a high degree of porosity which is prerequisite for different applications. Therefore, the lecture was focused on the development and adsorption characteristics of biomass-derived novel AC (BAC) having extremely large pore volume and high surface area. Several BAC samples are prepared from the two biomass precursors namely waste palm trunk (WPT) and mangrove (M). It is worthy to reveal that the highest surface area and pore volume for BACs are obtained about 2930 m^2/g and 2.87 cm^3/g, respectively. The maximum adsorption uptakes of ethanol onto WPT-AC and M-AC are found to be 1.9 kg/kg and 1.65 kg/kg, respectively. On the other hand, the maximum adsorption uptakes of CO_2 are found to be 2.74 cm^3/g for the WPT-AC followed by 2.54 cm^3/g for M-AC. It is evident from the experimental study that the BACs/ethanol and BACs/CO_2 pairs show remarkably high adsorption capacity, which are the current benchmark. It is highly expected that this novel BAC will significantly contribute towards the development of activated carbon-based industries and applications in adsorption heat pumps, CO_2 capture & storage, radioactive wastewater treatment, pollutant gases removal, and so on.

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

I brought several samples (adsorbent materials) to show the young enthusiastic students for better understanding of my lecture and science.

- 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


Adsorption Process
Silica gel