SD

※弊会記入欄

（学校用）

様式 A-1

(FY2023)

2023年9月22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: 京都府立城南菱創高等学校　坂田幹雄

2. 講師氏名: Dr. Nadezda V. CHERTKOVA

3. 講義補助者氏名: なし

4. 実施日時: 2023年 9月 19日 （火） 14:20 ～ 15:10

5. 参加生徒: 3 年生 13 人、 　年生 　人、 　年生 　人（合計 13 人）
   備考:（例:理数科の生徒） 普通科物理選択者

6. 講義題目: Welcome to the world of high pressure science!

7. 講義概要: ①ご自身の研究内容
   ②ロシアについて
   ③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 25 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、英語による質疑応答

   3) 事前学習
   (有)・ 無 （どちらかに〇をしてください。）
   使用教材 講師の方から事前に送られたキーワードリスト

9. その他特筆すべき事項:
   生徒たちの質問にも、常に笑顔で、優しく丁寧に答えて頂きました。

SD
※弊会記入欄

Form B-2
(FY2023)
Must be typed

Date（日付）
26/09/2023 （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）: CHERTKOVA Nadezda Valeryevna （ID No. P20029）

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

- Participating school（学校名）: Kyoto Prefectural JonanRyoso High School

- Date （実施日時）: 14:20−15:10 19/09/2023 （Date/Month/Year:日/月/年）

- Lecture title（講義題目）:
Introduction to High-Pressure Science

- 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） 25 min（分）, Q&A time（質疑応答時間） 25 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, used projector

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

I have been interested in science since my childhood. I used to ask my father "scientific" questions like:

"How does a rainbow form?"

"Why do black objects get hotter than white objects in the sun?"

When I was a high school student, I became interested in Chemistry, Physics and Biology. I entered the Faculty of Geology at the university and was able to gain deeper knowledge in these subjects. After graduation, I started to work at the research institute. Work at the laboratory is not easy, but it is very exciting.

On the surface of the Earth, we live at atmospheric pressure. Inside the planets, pressure increases with depth, reaching about 360 GPa in the center of the Earth. Let's see what happens to materials under high pressure.

Do you use pencils in you study? At atmospheric pressure, the graphite core of the pencil has layered structure. When you draw a line by the pencil, these layers remain on the paper. In

graphite structure, carbon atoms are arranged in hexagons in each layer. If we put graphite under high pressure and high temperature, its structure can change from hexagonal to cubic. From grey appearance it will transform to shiny and transparent diamond. If we look at the phase diagram of carbon, we can find that inside the Earth, most diamonds are stable at the depths of 150 kilometers and more.

You are familiar with the three standard states of H_2O: solid ice, liquid water and water vapor. These three states can be observed along the line of atmospheric pressure (101 kPa) on the phase diagram of H_2O. The ice that we see around us in winter has hexagonal structure, it is called ”ice I”. Let’s heat our ice to room temperature. In liquid water, H_2O molecules are attracted to each other by hydrogen bonds. If we squeeze water by applying pressure at room temperature, these molecules will be arranged into tetragonal structure and we will obtain another ice, which is called ”ice VI”. Let’s increase the pressure again and we will witness formation of yet another ice with cubic structure (“ice VII”). In the world of high pressure, there are many structures of ice. Scientists know more than fifteen structures and continue to discover new forms of ice.

In my research I use a device called “diamond anvil cell” to generate high pressures. In this device, the sample is squeezed between two diamond anvils and can be observed through transparent diamonds. Experimental cell is placed under the microscope, connected to Raman and infrared spectrometers. During experiments, phase transitions in the sample can be monitored by camera and confirmed by spectral analysis. It is very exciting to study new high-pressure phases of materials that we are familiar with at atmospheric conditions.

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

Information about Russian geography, natural resources, outstanding people, popular food and greetings was also provided during the lecture.

- 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。）:

GREETINGS

こんにちは。

Between friends: Privét

Polite form: Zdrástvuite

さよなら。

Between friends: Poká

Polite form: Do svidániya