SD3660
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Date（日付）
20/10/2020（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）: Elena Villani（ID No. P19769）

- Name and title of the accompanying person（講義補助者の職・氏名）
Shinsuke Inagi, Associate Professor

- Participating school（学校名）: Yamanashi Prefectural Kofu Minami Senior High School

- Date （実施日時）: 16/10/2020（Date/Month/Year:日/月/年）

- Lecture title（講義題目）:
Light in Chemistry

- Lecture format（講義形式）:
◆Lecture time（講義時間）80 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））
Lecture using a projector to show a power point presentation. After the presentation, an experiment was conducted

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

The lecture presented during the Science Dialogue Program had the main objective to introduce students to the concept of light generation using chemistry. The lecture constituted of an initial presentation and its discussion followed by an experimental demonstration.

The presentation was divided into two main parts. In the first part, I introduced myself and my country of origin, Italy, with a particular focus on my region. Successively, I explained how I started to study chemistry, travelling through again my interests during childhood and the studies that I made at the high school. I also briefly introduced my curriculum and my life during university studies at the University of Bologna, Italy, and then at the University of Bordeaux, France, during my first postdoctoral experience. The introduction section of my presentation concluded after showing how I engaged in research in Japan with my current host researcher.

The scientific content of the lecture was presented in the second part of my presentation and dealed with the use of chemistry to generate light. Here, students learned how light and chemistry are intimately correlated, starting with photosynthesis as the first example. Successively, the concept of using chemistry to generate light was introduced: in particular, light can be generated

using three different chemical pathways. The first one is called *Bioluminescence* and it is the light generated through a chemical reaction that takes place in a living organism. As example, the reaction sequence of fireflies luciferase was shown and briefly discussed. Students were also invited to answer some questions related to fireflies. The second process is called *Electrochemiluminescence* that is the generation of light after an electrochemical reaction. This topic, which is effectively my field of research, was briefly discussed using the example of a couple of molecules that represent the most used electrochemiluminescent system in literature. Furthermore, students could learn the real application of this technology, since it is at the basis of many benchtop analyzers currently in use in hospitals. Lastly, *Chemiluminescence* was introduced as the third process for making light, that is achieved by a simple chemical reaction of suitable starting molecules. To discuss this phenomenon, the example of a molecule called *Luminol*, and its use as a blood tracer in crime investigations, was shown to the students.

After the presentation, a chemiluminescent experiment was conducted. Students could observe the formation of the three primary colors of light, namely blue, green and red, generated by chemiluminescence process. The chemical reactions necessary to trigger the chemiluminescent processeses were perfomed by mixing together the corresponding starting reagents. Intense blue, green and red lights were generated upon mixing and can be seen by naked eye in a low illuminated environment. Such chemiluminescent process lasted for several minutes, giving time to students to fully appreciate the phenomenon. Finally, the three primary colors were properly mixed together to generate the other colors of the visible light; with this procedure, we could achieve white, purple, pink, yellow and orange colors.

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

When I started to work at the presentation material for the lecture, my goal was to interact with students and to gain their attention for all the time duration of the lecture. With this objective in mind, I prepared my presentation using many images and photos and I inserted many key words and technical/scientific terms in English together with the Japanese translation. These strategies seemed to effectively foster attention in students. However, it was the experimental demonstration that strongly stimulated curiosity among students, and many of them came close to the place of the experiment to observe better the chemiluminescent process.

- Impressions and commnets 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。）:

Villani 博士は本イベントに向けて資料や実験デモンストレーションなど様々工夫を取り入れてくれましたので、学生たちは発表内容を理解しようと真剣に聞いていましたし、実験の部もスムーズに進めることができました。まだ高校１年生ということもあり、英語で発言することは難しそうでしたが、私を介して日本語での質問も受け付けましたのでうまくコミュニケーションをとることができました。

当該高校では、コロナ禍の影響で ALT が不在の状況でしたので、英語での授業を受けるまたとない機会であったと先生たちから伺いました。また、サイエンス研究に英語が極めて重要であるということを若いうちから認識できる機会を与える活動として、本事業が果たす役割は大きいと感じております。