（For JSPS Fellow）

Form B-5

Date（日付）
2011・10．12 （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）: PIGOT Christian （ID No．P　10727　）

- Participating school（学校名）: 学校法人市川学園　市川中学校・市川高等学校

- Date （実施日時）: 2011・10．12 （Date/Month/Year:日/月/年）

- Lecture title（講演題目）:（in English）　Introduction to the Microworld
The case of diamagnetic levitation

（in Japanese）　マイコロー世界の序説　：反磁性来宇宙扶養の例えば

- Lecture summary（講演概要）: Please summary your lecture 200-500 words.

The aim of this lecture was to make the student understand the interest to make research at the microscale level. I wanted them to have the feeling that the world as they know it is completely different bellow the millimetre scale. I thus made an introduction about what is microscale before explaining the scale reduction laws, the fact that for small devices, the weight can be neglected with regards to other forces such as electrical one.

In this framework, diamagnetic phenomenon is a very good example. Diamagnetism is a very weak reaction of the mater to magnetic field. Diamagnetic materials are repealed by magnetic sources such as magnets. Nearly every material is diamagnetic, water, copper silicon, carbon, to name a few. In certain conditions, this force can be used to compensate the weight: levitation is achieved. Reaching levitation in a millimetre scale (i.e. observable with naked eyes) requires very specific conditions: the strongest magnet available (NdFeB) with the strongest diamagnetic material (Pyrolytic Carbone, basically superposition of graphene sheets). Doing so millimetre scale prototype is built.

This experiment is quite simple (see additional material) and was proposed to the students. They were given the magnets and this pyrolytic material. They had to arrange the magnets in an appropriate shape and cute a small part of the carbon. They all achieved levitation. This part was a little bit difficult, because of the small size of the device (magnets and sheet to be cut)

Application and interest of reducing the size of these devices was then show with

regard to my research. Reducing the size of both the magnets and the levitating particle make the diamagnetic force stronger by comparison with the weight. Material with higher density can then be levitated (example of bismuth) or with very low diamagnetic property (example of water). This last point is emphasised by comparison with a centimetre scale experiment. Living bodies are mostly composed of water. Their magnetic property is thus similar to the one of water. The levitation of a frog (centimetre scale) requires ultra high magnetic field (17T), while at the microscale simple permanent magnet are sufficient to levitate water. Scale reduction enhance diamagnetic force.

- Language used（使用言語）: English

- Lecture format（講演形式）:

◆Lecture time（講演時間） 75 min（分）, Q&A time（質疑応答時間） 15 min（分）

◆Lecture style（ex.: used projector, conducted experiments）

（講演方法（例：プロジェクター使用による講演、実験・実習の有無など））

I used projector for the presention and the explanation of the experriment. #) min were spend for the experiment.

◆Interpretation（ex.: assistance by accompanied person, provided Japanese explanation by yourself）（通訳（例：同行者によるサポート、講師本人による日本語説明））

◆Name and title of accompanied person（同行者 職・氏名）

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

- Impressions and opinions from accompanied person（同行者の方から、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。）: