Must be typed

（For JSPS Fellow）

Form B-5

Date（日付）
7/3/2017 （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）: Soowon LIM （ID No. P16370 ）

- Participating school（学校名）: Kyuyo Senior High School

- Date （実施日時）: 22/2/2017 （Date/Month/Year:日/月/年）

- Lecture title（講演題目）: （in English）Pulsed Power Science and Bioelectrics

（in Japanese） パルスパワー科学とバイオエレクトリクス

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

Recent advances in pulsed power technologies have resulted in increased availability and wider use of microwave transmitters that can emit nano- and micro- second pulses at peak powers of hundreds of megawatts or even gigawatts. High-power microwave (HPM) is widely used in communications, defense, underground exploration and a host of other applications. Especially, applications to biological and medical area are receiving great interest. One can reasonably expect that high peak, low average power radiation may cause biological reactions that are qualitatively different from known microwave effects and cannot be explained by ordinary heating. These biophysically different reactions will have a possibility of novel application area. Therefore, understanding of the biological effects of HPM irradiation is very important for extending use of HPM. Accumulation of experimental data including HPM conditions and theoretical analyzation of the data are also required.

Main feature of this research is applying the latest high-power microwave pulse generation technology to cancer therapy at first time in the world. As mentioned in the background of research, Dviatkov et al. performed a HPM irradiation to animals and cultured cells. They reported the effect of suppressing the growth of tumor and stimulating an immune system. However, Deviatkov used a microwaves from 30 ~ 300 GHz so-called 'millimeter wave'. The physical effects of HPM on cells are considered as depending on the frequency range and irradiation power (Kenneth R. Foster, 2000). In this research, over 100 MW peak power and 1 ~ 10 GHz frequency ranges which is unprecedented parameters for Bioelectric application will be used. Wide ranges of electrical parameters will be covered including the results so far. Moreover, with recently developed biological analysis methods enable us to further deep-level understanding.

The knowledge about the reflex-triode vircator (RTV) is not enough and it steel need an improvements. The RTV has been studied by Texas Tech University (recently 2014). According to the recent literature, they are focusing on the electrodes materials for the high-repetition rate operation. However, in this research, we paid attention to the distortion of the voltage waveform caused by an impedance mismatch between the peaking switch and electrodes in conventional RTV. We propose a structure to minimize the

impedance mismatch in order to achieve successful explosive electron emission on the cathode surface.

- Language used（使用言語）: English and Japanese

- Lecture format（講演形式）:

◆Lecture time（講演時間） 50 min（分）, Q&A time（質疑応答時間） 20 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））

プロジェクター使用による講演でした。 実験・実習はありませんでした

◆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））

同行者によるサポートがありました。

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

Nobuaki Ohnishi, Doctoral student

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

It might be better for foreign researcher if JSPS sciense dialogue program supports a sightseeing near the high school. I went to Okinawa island but I did not have enough time to go to sightseeing.

- 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。）: