# Chemistry Chat -Visit to a School Science Lab-

## Visit to a Science Club

### Chemistry Club at Shibuya Kyoiku Gakuen Makuhari Junior and Senior High School

## Introduction

On this occasion, we would like to turn a spotlight on the chemistry club at Shibuya Makuhari Junior and Senior High School, which has received multiple awards such as the Golden Award in the Chemistry Club Presentation 2011 hosted by the Chemical Society of Japan, Kanto Branch. We visited the club on July 30, 2013, just after the summer vacation had started. The school encourages the idea of "Self-thinking, Self-awareness" as an educational goal, and is very active in cross-cultural experiences to nurture internationally-minded individuals. At the laboratory where we were invited, the club members were preparing demonstration experiments for the school cultural festival in September. A student counseling room and teachers' office are located nearby, and it could be seen that the school has been providing a quality education in chemistry, which is rich in personal attention.

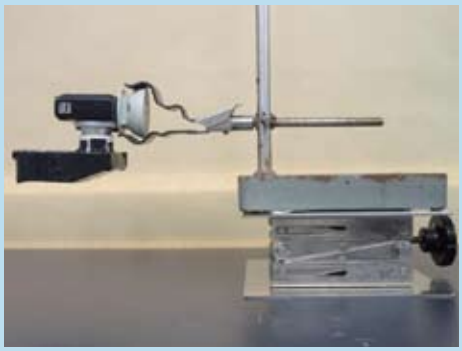
Members of the chemistry club with TCI pens and notes in hand. Four teachers Mr. Toya (back row left), Mr. Murakami (middle row left), Mr. Iwata (middle row right), Ms. Sahara (front row right), and the captain Ryoichi Yabuki (front row center).

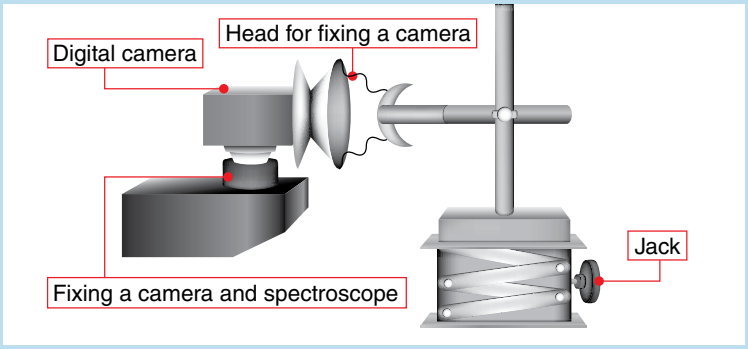
## Chemistry Club at Shibuya Makuhari Junior and Senior High School

This year, the chemistry club consists of 31 students (16 junior high and 15 senior high, including 5 female students) and 5 teachers (Mr. Iwata, Mr. Toya, Mr. Murakami, Mr. Oki and Ms. Sahara), and meets four times a week. The club activities begin with learning about experiments of interest by self-study, which are performed with proper guidance after much consultation with teachers. Students seek a study theme from questions and topics raised through this process to work on over time.

The results obtained from these experiments are sent out to the Science Research Presentation hosted by Chiba University (September), the Japan Student Science Awards (November, consecutively since 1991) and the Chemistry Club Presentation hosted by the Chemical Society of Japan, Kanto Branch (March). In December 2012, they also took part in the Japan Science and Engineering Challenge (JSEC). Aki Kitaori, the former captain and JFE Steel Award winner, was chosen to represent Japan at the Intel International Science and Engineering Fair (ISEF) in the U.S. in May, 2013. For school events, they perform demonstration experiments in the welcome festival for new students (April) and the annual cultural festival (September).

The chemistry club has already adopted a self-constructed DVD spectroscope for use in experiments, similar to the one described in the Rikkyo school article in TCIMAIL No. 159[1]. A photo of the real object is given below. The tool is of course hand-made and height-adjustable with a jack. For the spectrum analysis of images, Makali`i, a free image processing software distributed by the National Astronomical Observatory of Japan, is used. This software is able to display a graph of RGB and brightness values for a line segment on the active image. They analyze the spectral color information from the brightness values.






1) M. Makino "The creation of a simple discharge device using an aspirator" Minister of Education Award in Japan Student Science Award 2007, First Award in Coalition of Plasma Science in Intel ISEF 2008.
http://event.yomiuri.co.jp/jssa/works/works_prize51.htm (Japanese); http://www.sciserv.org/document.doc?id=75 (Page 26): http://www.plasmacoalition.org/plasma_pages/P_pages_Jun2008.pdf
2) Makali`i, SUBARU Image Processing software (National Astronomical Observatory of Japan)
http://makalii.mtk.nao.ac.jp/index.html.en

Here, students are performing various experiments. We had the opportunity to interview the club captain, Ryoichi Yabuki (11th grade).

- *How do you like the activities of the science club?*
  It is hard for junior and senior high school students to acquire college-level knowledge and experimental techniques, but it's a lot of fun. We cannot do without teachers with specialized knowledge. Experimental techniques, however, have been passed down from students in upper-grades to students in lower-grades. I believe that experience in the chemistry club will be helpful in my future.
- *What are your plans for the future?*
  I am interested in fields relating to chemistry and biology so I am taking a biology class, too, at my school. I would like to go to a college where I can study pharmaceutical sciences.

## Award winning results (school grade at the time of award receipt.)

**Academic year 2012:**

**10th Japan Science and Engineering Challenge (JSEC, hosted by the Asahi Shimbun, supported by multiple government agencies including the Cabinet Office)**
http://www.asahi.com/shimbun/jsec/jsec2012/winner.html (Japanese)
JFE Steel Award (A. Kitaori, 12th grade): Formation and Behavior of a Suspension Membrane

A suspension membrane of calcium hydroxide is formed in a striped pattern when calcium metal reacts with water. In this study, the forming conditions and behavior of the membrane are examined from experimental results, and its fundamental rule is considered. It is also demonstrated that the viscosity of a solution and surface tension are influential in forming a liquid membrane.

**30th Chemistry Club Presentation (hosted by Chemical Society of Japan, Kanto Branch)**
http://kanto.csj.jp/?page_id=177 (Japanese)
Idea Award (A. Funamoto, 11th grade): Study on the Flame Reaction of Copper Using a Self-constructed Spectroscope

This study examines the effect of anions contained in ionic substances by analyzing emission spectra of the flame light reaction when mixing various inorganic copper compounds and ionic substances. The self-made spectroscope described above and Makali`i for the spectrum analysis are used.

**Idea Award (R. Nakamura, 10th grade): Effects of Microwave Irradiation on Ionic Crystals and Their Hydrates**

This study observes the effects of microwave irradiation on ionic crystal hydrates. A microwave oven (700W) is used for the experiment.

**6th Science Research Presentation (hosted by Chiba University)**
http://koudai.cfs.chiba-u.ac.jp/n1_kr_houkoku24.htm (Japanese)
First Prize (R. Yabuki, 10th grade): A Method to Promote a Copper Dendrite Growth

Metal dendrites, crystals with a tree-like branching structure, can be separated from a metal having a smaller ionization tendency by making use of the differences among metals. In this study, Ryoichi Yabuki focuses on copper and examines various conditions to promote the dendrite growth. The shape of a zinc plate is reported to be the most influential on the growth.

**Second Prize (K. Shimomura, 11th grade): Forming Condition and Behavior of a Polyaniline Membrane**

Polyaniline membrane, a conductive polymer, is produced by mixing ammonium peroxodisulfate and a saturated aniline aqueous solution. This study aims to investigate the forming conditions of a membrane and the connection between its electrical conductivity and color. Kai Shimomura has found that the electrical conductivity and color are changed by adding acids and bases when a membrane is formed, and also reports that addition of metal ions causes an increase in membrane intensity and alteration of electrical conductivity.

**Second Prize (S. Masuda, 10th grade): A New Method for the Synthesis of Esters**

This study reports on the synthesis of esters with silica gel as an acid catalyst. This reaction proceeds efficiently even at 30 ºC.

**Academic year 2011:**

**29th Chemistry Club Presentation (hosted by Chemical Society of Japan, Kanto Branch)**
http://kanto.csj.jp/?page_id=168 (Japanese)
Golden Award (K. Miyamoto, 11th grade): Study on Luminol Chemiluminescence
Best Poster Award (K. Teranishi, 10th grade, S. Nakamura, 8th grade): Origin of Life, Part VI
Best Poster Award (K. Shimomura, 10th grade): Effects of Amines on Aniline Oxidation
Best Poster Award (Y. Misawa, 8th grade): Preparation of a Fluorescent Material Glowing Three Colors

**5th Science Research Presentation (hosted by Chiba University)**
http://koudai.cfs.chiba-u.ac.jp/n1_kr11_houkoku23.htm (Japanese)
First Prize (A. Kitaori, 11th grade): Formation of a Suspension Membrane Containing Calcium Ions
Second Prize (S. Nitta, 11th grade): Silver Mirror Reaction with Common Drinking Water

## Closing Remarks

We had opportunities to talk with the 11th-grade club members during this visit. Each one of them talked about chemistry in their own words, and from this, we are sure that the school's educational policy "Self-thinking, Self-awareness" is not just a written slogan. We wish continued success and future growth for the chemistry club of Shibuya Makuhari Junior and Senior High School. We will continue our visits to school science labs to meet new people and to make new discoveries.