From Kyushu University to the world. Introducing research activities that will bring us to the realization of a carbon-neutral society.

Hello! I²CNER

October 2015
vol.14

International Institute for Carbon-Neutral Energy Research

Science Café

Hydrogen: the Ideal Energy
The Ultimate Production Method Using Photocatalysts

Motonori Watanabe Assistant Professor, Molecular Photoconversion Devices Division, International Institute for Carbon-Neutral Energy Research

Fukuoka Maizuru High School

Impacting Society By Solving Problems

wpi World Premier International Research Center Initiative
I²CNER
KYUSHU UNIVERSITY
ILLINOIS UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Meet I²CNER's Newest Researchers

Welcome to I²CNER!

Yuki Terayama

Post-doctoral Research Associate

Electrochemical Energy Conversion Division

I joined I²CNER in May 2015 after finishing my Ph. D. at Kyushu University and working at a medical company. My primary research topics are preparation and characterization of polymer thin-films. I also developed a surface-treatment for a catheter, which is used in endovascular operations. Currently, I work on the development of a water electrolysis cell which uses surface proton conductivities. In I²CNER's excellent research environment, I work hard to create novel developments in the area of fuel cells. My hobbies include playing futsal and watching soccer games. The highlight of my summer was seeing my firstborn child.

Yutaka Yamada

Post-doctoral Research Associate

Thermal Science and Engineering Division

I joined I²CNER in April 2015 after I got my Ph. D. from Kyushu University. I am very happy to be able to perform research as a member of I²CNER. My research focuses on phase change phenomena, such as condensation and boiling of liquid. Not only are these phenomena observed in everyday life, but they are also important for industrial applications. However, there remain many mysteries surrounding the mechanisms that occur at the micro- and nanoscales which I would like to explain through my research. In my free time, I enjoy programming and reading.

Nguyen Thi Thanh Nga

Post-doctoral Research Associate

Catalytic Materials Transformations Division

Hi, everyone! I come from Ho Chi Minh City, Vietnam. Upon completing my Ph. D. studies at Kyushu University, I joined the Catalytic Materials Transformations Division at I²CNER, beginning April 1, 2015. My research is focused on exploring a new enzymatic electron transfer system, which is the making and breaking of organic molecules to generate energy. Using this system, I would like to construct a model system for the activation of small molecules (H_2, O_2, CO_2, N_2, and H_2O) to stimulate electron flow. I believe that the naturally occurring biocatalysts should provide new insight into the design of effective synthetic catalysts, which may help to achieve our research goals for developing carbon-neutral energy, such as H_2 activation, CO_2 conversion, and N_2 fixation. In my leisure time, I enjoy playing badminton, listening to music, shopping, and occasionally traveling around the Kyushu area.

~Guests from the University of Illinois at Urbana-Champaign~

The Director of I²CNER, Prof. Sofronis, is a faculty member at the University of Illinois at Urbana-Champaign (UIUC), where the I²CNER Satellite Institute resides. I²CNER, Kyushu University (KU), and UIUC have been working collaboratively to develop bilateral ties and promote student exchange on an institutional level. In order to further strengthen these ties, various UIUC upper administrators, including the former Chancellor, Dr. Phyllis Wise, Vice Provost Mabokela, and the Dean of the College of Engineering, Dr. Andreas Cangellaris, have all visited Kyushu University within the past year. Each of their visits is described below.

L to R : I²CNER Director Sofronis / Associate Chancellor Khanna / Former Dean, Faculty of Engineering, Dr. Yamada / Former Chancellor, Dr. Wise / Executive Vice President Wakayama / Executive Vice President Aoki / Former I²CNER Administrative Director, Dr. Fujiki / I²CNER Associate Director Ishihara / I²CNER Associate Director Takata

2014.11.7 Former Chancellor Phyllis M. Wise

Dr. Wise visited KU's world-class facilities, such as HYDROGENIUS and the Center for Advanced Medical Innovation, etc. Executive board members of KU gave her a warm welcome and hosted several meetings with her to discuss all issues related to I²CNER.

2015.6.22 Vice Provost for International Affairs and Global Strategies, Reitumetse Obakeng Mabokela

In order to enhance the collaboration between the two universities and determine strategies for leveraging the best characteristics of both institutions, Dr. Mabokela had meetings with a variety of KU's administrators, including Executive Vice Presidents Maruno, and Aoki, VP Ogata, the Dean of the Faculty of Engineering, Dr. Takamatsu, University Library Director General, Dr. Miyamoto, and the Institute of Mathematics for Industry Director, Dr. Fukumoto. Her visit also included a frank discussion with some of KU's young researchers, in which she shared many of her views.

L to R : I²CNER Director Sofronis / Vice Provost Mabokela / Executive Vice President Aoki / Vice President Ogata / Dean of the Faculty of Engineering, Dr. Takamatsu / I²CNER Associate Director Ishihara

2015.6.30 Dean of the College of Engineering, Andreas Cangellaris

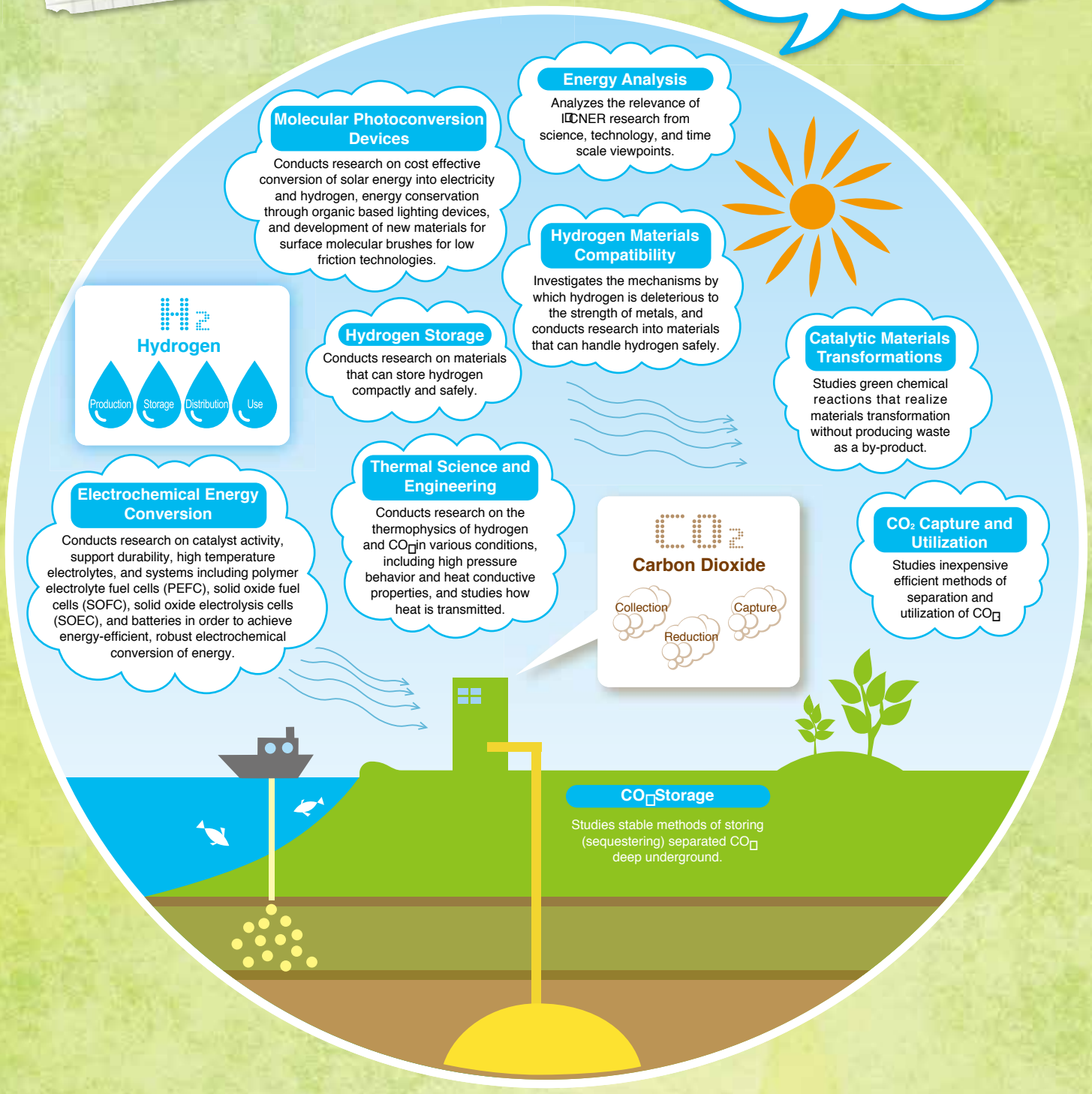
Dean Cangellaris visited KU to exchange views on general collaboration between the Colleges of Engineering at KU and Illinois, and more specifically, how medical simulation can be improved using engineering techniques. Dean Cangellaris had meetings with several of KU's administrators, including Executive Vice Presidents Wakayama and Aoki, the Dean of the Faculty of Engineering, Dr. Takamatsu, the Dean of the Graduate School of Faculty of Information Science and Electrical Engineering, Dr. Okada, the Dean of the Graduate School of Medical Science, Dr. Sumimoto, and the Dean of the Faculty of Mathematics, Dr. Hara.

L to R : I²CNER Associate Director Ishihara / I²CNER Director Sofronis / Dean Cangellaris / Executive Vice President Wakayama / Executive Vice President Aoki / Dean of the Faculty of Engineering, Dr. Takamatsu/ and the Vice Dean of the Faculty of Engineering, Dr. Hisaeda

Research Division Introductions

What is a carbon-neutral society?

This is a society where CO_2 emissions generated by energy use are reduced to a minimum, and where a balance is achieved emissions and the amount that is absorbed and stored in the natural world.



Introducing the nine research divisions of I²CNER, which are engaged in cutting edge research to create a green and clean carbon-neutral society free of CO_2 emissions.

Hello! I²CNER 2015

Science Café

Hydrogen: the Ideal Energy
The Ultimate Production Method Using Photocatalysts

Discussion Participants

Motonori Watanabe
Assistant Professor
Molecular Photoconversion Devices Division
International Institute for Carbon-Neutral Energy Research (I²CNER), Kyushu University

&

Junichiro Kawaguchi
Mone Kawazoe
Second-year students

Marina Koikawa
Yukina Hirokawa
Third-year students

Fukuoka Maizuru High School
(As of August 2015)

Although we now depend primarily on fossil fuels, such as petroleum and coal, as energy sources, the major disadvantage to these fuels is that they emit CO_2 when they are burned. However, when hydrogen is used as an energy source, its only byproduct is water. In addition, while fossil fuel resources are likely to be exhausted someday, there is no concern about running out of hydrogen. Considering all this, hydrogen may seem to be the ideal energy source, but there are still some hurdles to be overcome, not the least of which is an efficient production method, before it can come into widespread use. Students at Fukuoka Maizuru High School participated in a discussion with Professor Motonori Watanabe, who is engaged in research on developing an innovative hydrogen production method that uses a photocatalyst. They also tried their hands at an experiment to generate hydrogen using a photocatalyst.

Energy's Vital Role in Everyday Life

Watanabe: Energy is absolutely essential to our daily lives. By way of example, how did you get here today?

Koikawa: Our teacher drove us here.

Watanabe: I see. And how was the car powered?

Kawaguchi: It gets power by burning gasoline.

Watanabe: When gasoline is burned, are there any negative side effects?

Kawazoe: It emits exhaust fumes, which contain CO_2. Since CO_2 is a greenhouse gas, it leads to climate change.

Hirokawa: Exhaust fumes also contain soot.

Watanabe: That's right. Soot causes environmental problems such as acid rain. You sometimes travel by train, right? How are trains powered?

Kawaguchi: By electricity, of course.

Watanabe: Electricity is produced at a power plant. There are roughly 3 types of power plants in Japan. Can you name each type?

Koikawa: Thermal power, nuclear power, and hydropower. However, since the Great East Japan Earthquake, nuclear power plants have essentially been out of operation. *(as of July 2015)

Kawazoe: Crude oil and coal are burned at thermal power plants, and they emit CO_2. Although we have to prevent climate change, we cannot live without electricity. What should we do?

Energy Sources and Climate Change

Watanabe: Energy is indispensable to our everyday lives. However, if we keep burning

fossil fuels to generate power, CO_2 levels in the atmosphere will continue to increase, which will advance climate change.

Hirokawa: I know that oil will be exhausted someday. Moreover, Japan does not have oil resources. What if we cannot import oil from foreign countries?

Watanabe: Without energy, we cannot live. On the other hand, we need to reduce CO_2 emissions.

Koikawa: I heard that I^{2}CNER is an Institute working to solve such issues.

Watanabe: You are well informed. That is exactly right. We are pursuing two research themes. One is how to decrease, or at the very least, cap CO_2 emissions at their current levels, and the other is how to use hydrogen as a new energy carrier.

Kawaguchi: Speaking of hydrogen use, since fuel cell vehicles (FCVs) use hydrogen as energy, they don't emit CO_2 exhaust like gasoline-powered vehicles, right?

Kawazoe: If we can generate power using hydrogen, then we won't emit CO_2 when we produce electricity.

Watanabe: That's precisely why expectations for hydrogen as a new energy carrier are so high.

Barriers to Hydrogen Becoming the Ideal Energy

Koikawa: If hydrogen is such an excellent fuel, why isn't it used more?

Watanabe: For example, FCVs were put on the market at the end of last year. Has anyone seen an FCV running?

Kawaguchi: Now that you mention it, I think I have never seen one. I wonder why.

Watanabe: One of the reasons is that it is very costly. By the way, do you know how an FCV works?

Kawazoe: A hydrogen tank is filled and power is generated by reacting the hydrogen with oxygen. The byproduct of this reaction is water. In other words, a fuel cell generates power by causing a reverse reaction of water electrolysis.

Watanabe: Very good. Even though the process sounds simple, there are a lot of challenges related to fuel cells and hydrogen. Since a lot of costly materials are currently used to manufacture fuel cells, FCVs are not cheap. In addition, we need to be able to produce hydrogen in large quantities to be able to offer it at a reasonable price.

Hirokawa: How do you produce hydrogen?

Watanabe: 90% of hydrogen is now produced using a "steam-reforming method." In this method, using nickel as a catalyst, methane and water are heated to a high temperature to produce hydrogen.

Kawaguchi: The chemical structural formula of methane is CH_4. As it contains carbon, doesn't this cause a problem when it is heated at high temperatures?

Watanabe: Yes, it emits a poisonous gas called carbon monoxide. Furthermore, fuel is used to achieve this high heat.

Koikawa: Then we should be able to produce hydrogen by electrolysis of water.

Watanabe: Actually, a little less than 10% of hydrogen is currently produced by electrolysis. Obviously, electrolysis also has its challenges.

Kawazoe: Aha! The fact that electricity is needed for electrolysis means that we have to use something else as a fuel to produce hydrogen.

The Ultimate Hydrogen Production Method: the Photocatalyst

Watanabe: Considering all these issues, we are now studying a hydrogen production method which uses a photocatalyst. Unlike the steam-reforming method, this method does not require fuels, nor does it emit carbon monoxide. In addition, it does not require electricity, which makes it advantageous compared to water electrolysis.

Koikawa: Can you produce hydrogen without using anything?

Watanabe: No, that is impossible. For this method, we use a catalyst and light, in other words, solar energy. By the way, do you know what a catalyst is?

Kawaguchi: I read in a textbook that a catalyst is a substance that accelerates the speed of a specific chemical reaction, and that the substance itself does not change before or after the reaction. For example, when we use manganese dioxide as a catalyst in a hydrogen peroxide solution, it causes a chemical reaction which produces oxygen and hydrogen.

Watanabe: That's a full mark answer. Using light as an energy source, a photocatalyst causes a chemical reaction in water that produces hydrogen and oxygen.

Laboratory Visit

Let's Produce Hydrogen Using a Photocatalyst (TiO_2)

Experiment Part1 Reduction Reaction

This part of the experiment shows how a reduction reaction occurs when using a transparent reagent of methyl viologen. Though the reagent is originally transparent, it causes a reduction reaction and turns blue when TiO_2 is added under irradiated light. During the experiment, the reagent successfully turned blue, which demonstrated that a reduction reaction actually occurred.

Experiment Part2 Photocatalyst Reaction

This part of the experiment generates hydrogen using a photocatalyst. What happens when a dyed photocatalyst is put into water and is exposed to strong light? The students saw with their own eyes that a photocatalyst reaction actually occurred, and gas (in fact, hydrogen) was produced from water in a steady stream.

Hirokawa: If such a wonderful catalyst is realized, we will be able to solve all our energy issues at once. What do you use as the photocatalyst?

Watanabe: The most commonly used material is titanium oxide (TiO_2). TiO_2 has been already put into practical use. By way of example, it is used in sunscreens and painted on the walls of operating rooms in hospitals. Sunscreens block ultraviolet rays, and TiO_2 paint has a sterilizing effect, which is especially useful in operating rooms. When TiO_2 is used as a photocatalyst, it accelerates a redox reaction.

Koikawa: By reducing water, we extract hydrogen at the same time as oxygen is being produced. Since such uses for TiO_2 are already so common, why hasn't hydrogen production using TiO_2 as a photocatalyst been already put into practical use?

Watanabe: Unfortunately, it is still in the research phase because of the low efficiency of hydrogen production using this method. Although it is true that we can produce hydrogen, we cannot do so in large quantities because TiO_2 only absorbs UV light.

Kawazoe: Why does this cause low production efficiency?

Watanabe: As you'll recall, photocatalysts use light as an energy source. However, there are only small amounts of infrared and ultraviolet radiation in light, depending on the wavelength.

Kawaguchi: So the problem lies in the fact that the UV light is such a small percentage of the light?

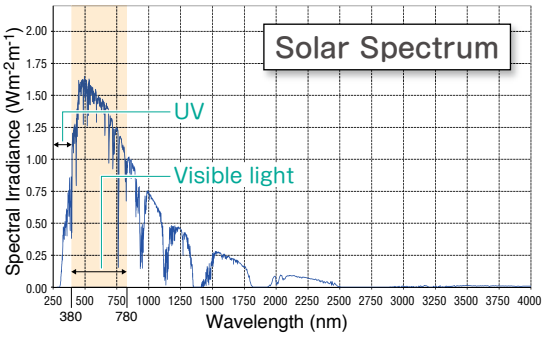
Watanabe: Exactly. The strongest part of solar energy is the visible light. However, TiO_2 absorbs only the ultraviolet radiation, which accounts for just 7% of the solar energy. Therefore, we are working on a research project where we dye the photocatalyst to enhance its production efficiency.

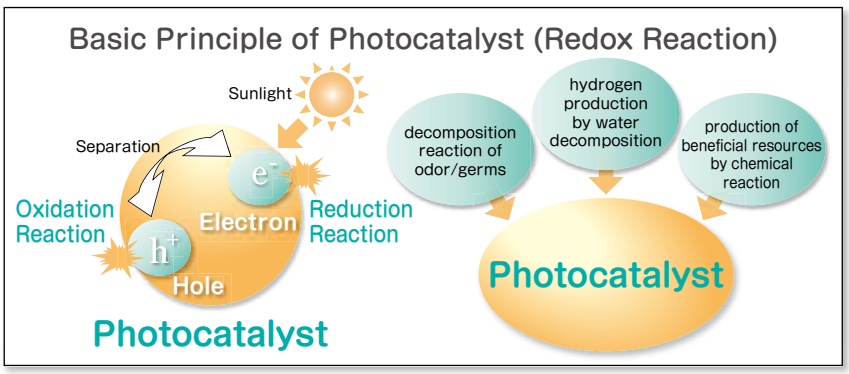
Hirokawa: Hydrogen produced using solar energy with no CO_2 emissions or electricity use really would be a dream technology.

Watanabe: You are right, but we don't think of our research in terms of a remote future. Rather, we stay precisely focused on adapting our methods for practical use.

Koikawa: If this technological development succeeds, our society will be using clean energy by the time we become adults.

Watanabe: In order to realize an environmentally-friendly hydrogen energy society and an overall carbon-neutral society, I²CNER researchers devote ourselves completely to our research. We still have a lot of challenges to address, but having seen your enthusiasm for the science, I have high hopes that we can one day pursue this research together. I believe in the power of youth to make our environment a better one.





Message to Students from Professor Watanabe

I²CNER is pursuing research that has the potential to overcome the roadblocks to the adoption of hydrogen energy and CO_2 capture and storage in the drive for a carbon-neutral society. If the research we have been pursuing on photocatalysts advances, we will be able to produce hydrogen easily using only light and water. At that point, people all over the world would be free from energy concerns. Top researchers from around the world have gathered here precisely for achieving this goal. We almost always speak English when we are conducting daily research activities. I heard some of you want to study at Kyushu University. I would encourage you to consider joining I²CNER. Let's work together on research in a global environment for the betterment of humankind.

Post-discussion

Fukuoka Maizuru High School

This discussion was made possible through the participation of students from Fukuoka Maizuru High School. Fukuoka Maizuru is a private high school with an approximate 100-year history. The school focuses on education aimed at developing well-rounded individuals with a balance amongst knowledge, compassion, and motivation. The school also promotes after-school activities, including club activities. Some of them are active in the global arena, as evidenced by their representation of Japan in the World Robot Olympiad. The school has implemented various systems to help students realize their dreams. For example, "My Program" supports students who hope to enter top public and private universities, and "My Plan" allows students to choose their favorite field from a variety of options that appeal to students' interests, such as cooking or Arabic.

Junichiro Kawaguchi
Since I was three years old, I have wanted to be a doctor so that I could save people. But today, I became interested in this field, since I learned from today's lab visit that we can also save people by solving energy issues. It was very impressive to actually see the moment hydrogen was created.

Mone Kawazoe
Although I was expecting something difficult when I was invited to visit a research institute, I was actually surprised to learn that hydrogen, a familiar substance to all of us, has such great possibilities. Prof. Watanabe's explanations were enlightening. I want to work in an energy-related field in the future, which would allow me to take advantage of my knowledge of my favorite subject, physics.

Marina Koikawa
I was surprised to learn that some of the world's most advanced research is being carried out at a facility so to near us, and that this research involves so much large equipment and several high-tech laboratories. I was very interested in research that aims precisely at practical application, and this experience provided me with a good opportunity to think about my future.

Yukina Hirokawa
Today's experiment included things we studied at high school. It was interesting to actually look at and touch research equipment and chemicals. I realized how fun science is, especially since I noticed that we can apply what we study at school to a variety of things.

AWARDS

Young Researcher Award / The Seismological Society of Japan

Prof. Takeshi Tsuji (CO₂ Storage Division)

Prof. Takeshi Tsuji received the Young Researcher Award from the Seismological Society of Japan for his distinguished achievement on "Elucidating the fault system in the plate subduction zone based on offshore seismic data." (March 9, 2015)

The International Institute of Refrigeration (IIR) Science and Technology Medal

Prof. Shigeru Koyama (Thermal Science and Engineering Division)

Prof. Shigeru Koyama received the IIR Science and Technology Medal for the important role he has played in the scientific and practical fields of refrigeration, air conditioning, and heat pumps. (March 11, 2015)

2015 American Chemical Society (ACS) Polymeric Materials Science and Engineering Division (PMSE) Distinguished Service Award

Prof. Benny Freeman (CO₂ Capture and Utilization Division)

Prof. Benny Freeman received the Distinguished Service Award from the American Chemical Society's Division of Polymeric Materials: Science and Engineering for his contributed, pioneering accomplishments at the intersection of processing and materials properties, especially in the areas of nanocomposites and membranes. (July 17, 2015)

The Society of Exploration Geophysicists of Japan 132nd Best Presentation Award

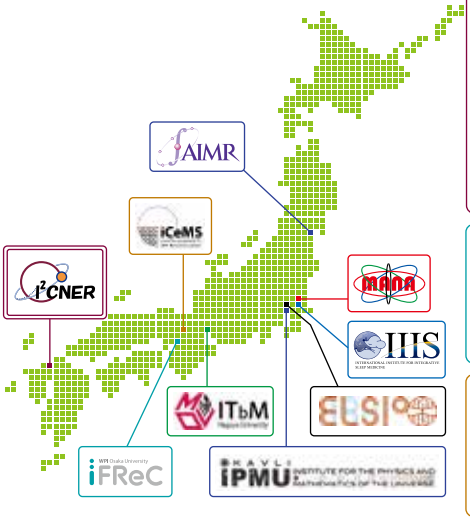
Dr. Tatsunori Ikeda / Prof. Takeshi Tsuji (CO₂ Storage Division)

Dr. Tatsunori Ikeda and Prof. Takeshi Tsuji received 132nd Best Presentation Awards from the Society of Exploration Geophysicists of Japan for their respective presentations, "Surface-wave analysis for monitoring subsurface structure using ACROSS" and "Digital rock physics for quantitative monitoring of geologically stored CO_2." (July 19, 2015)

What is WPI?

wpi World Premier International Research Center Initiative

The World Premier International Research Center Initiative (WPI) is a project that was launched by the Ministry of Education, Culture, Sports, Science and Technology (MEXT) in 2007. The WPI seeks to form an ideal research environment within visible research centers that maintain high research standards, where leading researchers will be attracted from all over the world.



I²CNER Kyushu University International Institute for Carbon-Neutral Energy Research (I²CNER)

Toward the realization of a low-carbon society, I²CNER aims to resolve the challenges of the use of hydrogen energy and CO_2 capture and sequestration by fusing together sciences from the atomic level to the global scale.

Refer to:
MEXT Website http://www.mext.go.jp/english/research_promotion/1303822.htm
JSPS Website http://www.jsps.go.jp/english/e-toplevel/index.html

AIMR Tohoku University Advanced Institute for Materials Research (AIMR)

Integrating physics, chemistry, materials science, bioengineering, electronics and mechanical engineering, AIMR is striving to create innovative functional materials. A mathematical unit joined the team in 2011 to help establish a unified theory of materials science, aiming at the realization of a global materials research hub.

iFReC WPI Osaka University Osaka University Immunology Frontier Research Center (IFReC)

An innovative research center, which pursues the goal of comprehensive understanding of immune reactions through the fusion of immunology, various imaging technologies, and Bioinformatics.

MANA National Institute for Materials Science International Center for Materials Nanoarchitectonics (MANA)

A major focus of our activities is the development of innovative materials on the basis of a new paradigm "nanoarchitectonics," ground-breaking innovation in nanotechnology.

iCeMS Kyoto University Institute for Integrated Cell-Material Sciences (iCeMS)

Established to integrate the cell and material sciences, the iCeMS combines the potential power of stem cells (e.g., ES/iPS cells) and of mesoscopic sciences to benefit medicine, pharmaceutical studies, the environment, and industry.

IPMU Kavli Institute for the Physics and Mathematics of the Universe (Kavli IPMU), Todai Institutes for Advanced Study, The University of Tokyo

With accumulated research on mathematics, physics and astronomy, this research core works to bring light to the mysteries of the universe, such as its origin, and to provide an analysis of evolution.

ELSI Tokyo Institute of Technology EARTH-LIFE SCIENCE INSTITUTE(ELSI)

ELSI focuses the origins of Earth and life. Both studies are inseparable because life should have originated in unique environment on the early Earth. To accomplish our challenge, we establish a world-leading interdisciplinary research hub by gathering excellent researchers in Earth and planetary sciences, life science, and related fields.

IIIS University of Tsukuba International Institute for Integrative Sleep Medicine(IIIS)

IIIS seeks to elucidate the fundamental mechanism of sleep/wakefulness, to develop strategies to regulate sleep, and to contribute to the enhancement of world health by combatting sleep disorders and associated diseases.

ITbM Nagoya University Institute of Transformative Bio-Molecules (ITbM)

The goal of ITbM is to develop innovative functional molecules that make a marked change in the form and nature of biological science and technology (transformative bio-molecules). ITbM will connect molecules, create value, and change the world, one molecule at a time.

Editor's Note

- I²CNER holds a variety of events.
  for details pease see: ➡http://i2cner.kyushu-u.ac.jp/en/
  I²CNER Search
- For the first time ever, the Special Interview that is featured in Energy Outlook was conducted via videoconference, proving that the expanse of the Pacific cannot inhibit I²CNER's dedication to finding carbon-neutral energy solutions. We would like to express our gratitude to Dean Robertson for accommodating the 14 hour time difference between Wisconsin and Japan, despite his busy schedule. We are also grateful to Dean Robertson for sharing his expertise in the area of Materials Science so that we could present a unique and informed perspective on possible solutions for energy issues. As always, if you have any feedback, please feel free to email us.

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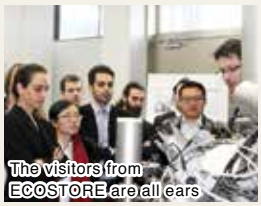
I²CNER Event Reports

March 5, 2015

The 1st ECOSTORE Young Researcher Workshop


Workshop Group Photo


The visitors from ECOSTORE are all ears

Recently, Kyushu University / I²CNER signed an agreement with the ECOSTORE Consortium project. This program is supported by the EU and aims to encourage young European researchers to work on their research for a sustainable, carbon-free, and reliable energy system. At this 1st ECOSTORE Young Researcher Workshop, 14 researchers from 8 European countries visited I²CNER and presented their latest research findings. They also visited I²CNER labs and participated in discussions with I²CNER researchers.

May 27-29, 2015

The 11th Japan-France Workshop on Nanomaterials, The 2nd WPI-Workshop on Materials Science


Group photo of participants from the 4 WPI Institutes


Director Sofronis gives his lecture


One workshop participant looks at the I²CNER poster

From May 27-29, 2015, the 11th Japan-France Workshop on Nanomaterials and the 2nd WPI-Workshop on Materials Science were held in Rennes, France. The Japan-France Workshop on Nanomaterials was started in 2000, and is intended to encourage collaborative research and researcher exchange between Japan and France in the area of nanomaterials. The WPI-Workshop on Materials Science was started in 2013 as a joint event between the 4 WPI institutes that are involved in materials science. This year, Director Sofronis, Prof. Fujikawa (CO_2 Capture and Utilization Division), and Prof. Yamauchi (Catalytic Materials Transformations Division) attended the workshops and presented their latest research. Director Sofronis also gave a general presentation on I²CNER.

May 15, 2015 & July 3, 2015

Science Café at Fukuoka


Prof. Nishihara discusses challenges related to a hydrogen energy society


Prof. Tsuji explains the challenges related with CCS

Prof. Masamichi Nishihara (Electrochemical Energy Conversion Division) and Prof. Takeshi Tsuji (CO_2 Storage Division) gave lectures at the 29th and 30th Science Cafés at Fukuoka. At the 29th Science Café, Prof. Nishihara discussed a possible reason why hydrogen energy is attracting attention as a new energy resource and the challenges for creating a hydrogen energy society. In addition, he pointed out that the development of infrastructure is essential for the widespread use of fuel cell vehicles. At the 30th Science Café, Prof. Tsuji explained the mechanism that causes earthquakes to occur and demonstrated a method for capturing images of the earth's surface with satellites by showing movies that were created using the SHINKAI 6500, a Manned Research Submersible. He also introduced the current state of research and challenges of CCS (carbon capture and storage). After both lectures, the participants engaged in a lively question and answer session with the lecturer.

I²CNER Event Reports

August 5-6, 2015

Super Science High Schools (SSH) Student Workshop


Dr. Téllez talks to students at "Researchers Mini Live"


Students learn about WPI at the booths

9 World Premier International Research Center Initiative (WPI) Institutes, including I²CNER, ran booths at the "Super Science High Schools (SSH) Student Workshop," which was held at the INTEX Osaka on August 5th and 6th. The event is intended to foster students' interest in science and technology and promote the SSH project. I²CNER, along with the Advanced Institute for Materials Research (AIMR), and the International Center for Materials Nanoarchitectonics (MANA), ran a booth to introduce our research. 6 WPI researchers, including Dr. Helena Téllez (Electrochemical Energy Conversion Division), gave lectures at "Researchers Mini Live." More than 30 high school students and teachers attended Dr. Téllez's lecture, in which she described her research and her career path from high school to the present-day. 25 overseas high schools and nearly 100 students presented their research at the event, making this SSH Student workshop the most international one to date.

I²CNER Building 2 has been completed


Exterior Elevation of I²CNER building 2

Three years after its inception as the sixth WPI center, in January 2013, I²CNER celebrated the inauguration of its first building, which is located at the center of the Ito Campus of Kyushu University. Since the start of the I²CNER project, the number of researchers from all over the world has increased significantly, making it necessary to secure additional research space in order to maintain the high quality research environment that is indicative of a top-level research center.

With this objective in mind, I²CNER Building 2, which is 4 stories tall and has a total floor space of 5,000m², was completed in February 2015. Holding true to the I²CNER mission and vision for creating a carbon-neutral society, I²CNER Building 2 was designed around the concepts of sustainability, harmonization, and consciousness of environmental impact. The interior space of the building was designed carefully in order to convey a sense of openness and freedom, especially with regard to the sharing of ideas. Specifically, the interior design features vaulted ceilings, abundant windows, and floor-to-ceiling glass walls throughout many offices, laboratories, meeting spaces, and lounges in the building. The goal of having so many open office, meeting, and laboratory spaces is to facilitate and enhance I²CNER's interdisciplinary / fusion research efforts.


Researchers hard at work in one of I²CNER's new open labs


A unique feature of I²CNER Building 2 is its outdoor collaboration space


I²CNER Buildings 1 & 2 are joined by a skywalk so that its researchers are never more than a few steps away from one another