OKAYAMA UNIVERSITY e-Bulletin



Vol.19, August 2017



"Okayama University supports the Sustainable Development Goals"

Contents

Feature -

Okayama University launches "Discovery Program for Global Learners"

News -

- Okayama University Hospital successfully conducts lung transplant surgery from brain-dead donor to Japan's youngest recipient
- Communauté Université Grenoble Alpes delegation visits Okayama University to strengthen partnership
- Commemorative symposium for the opening of the Okayama University-Wayne State University Joint Research Laboratory (OU-SCEED)
- Ninth course students of Okayama-Hue International Master's Program meet their sponsors
- Shunsuke Shimada of the Faculty of Environmental Science and Technology selected as one of the "30 Under 30 Asia" Young Entrepreneurs

Research Highlights _____

- · Mechanism of photosynthetic water-splitting revealed by an X-ray free electron laser
- Innovative carbon nanotube photocatalytic materials for efficient solar energy conversion and hydrogen production
- Reassessing nomenclature for 'horned turban' snail
- Infrared spectroscopy: Nanostructured metamaterials identify the chemical nature of tiny molecules

Topics -

Radio Message from International Students (World Heartful Message)

Further information –

About Okayama University

Feature

Okayama University launches "Discovery Program for Global Learners"

A new innovative, multidisciplinary undergraduate program for globally-minded students in Japan and overseas starts October 2017. Students can pursue their undergraduate degree entirely in English, or by combining English-based and Japanese-based courses.

With over 140 years of history and an international reputation for excellence in research and education, Okayama University graduates have made significant contributions to society in the areas of sciences and engineering, arts and social sciences, medicine, dentistry, and pharmaceutical sciences. To further the university's fundamental mission of "promoting stable and sustainable advancement of human society," the university will launch the Discovery Program for Global Learners, leading to a Bachelor of Arts and Sciences, in October 2017.

"The Discovery Program for Global Learners aims to nurture young leaders who will take active roles on the global stage," says Ayami Nakatani, director of the program.

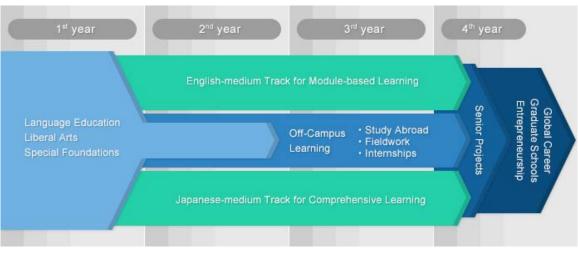
Overview of the Discovery Program for Global Learners

The salience of the program is that the students can pursue their degree entirely in English if they wish, a major shift from the majority of universities in Japan. At the same time, the Discovery Program also allows students to take courses taught in Japanese. Another distinctive feature of the program is the diverse student body, consisting of 30 students selected through domestic application, 30 selected through international application, and few through International Baccalaureate application. They may include, but are not limited to, Japanese students who completed their secondary education in Japan, international students who completed their education overseas, students of all nationalities who were born and raised in Japan by one or more foreign-born parent, and Japanese students who have lived in multi-lingual environments.

Students can select courses from two tracks:

- <u>The Japanese-based Open Track</u> allows students to pursue their studies mainly in the University's ten existing faculties, ranging from humanities and social sciences to natural sciences and engineering.
- <u>The English-based Discovery Track</u> consists of three clusters: (1) Social Innovation and Entrepreneurship, (2) Cultural Diversity and Communities, and (3) Transdisciplinary Sciences for Global Sustainability).

The important point about the Discovery Program is that students can customize and design their own curriculum and areas of study to fit their career goals. Through practical experiences such as fieldwork, internships, and scientific collaboration with faculty members, students can also develop multidisciplinary skills to tackle wide-ranging global issues.



Curriculum of the Discovery Program for Global Learners

Details about the English-based Discovery Track

The <u>Transdisciplinary Sciences for Global Sustainability</u> cluster is designed to instill students with knowledge and skills in environmental engineering, agricultural science, and astrochemistry. Specific modules offered in the areas of Astronomical and Atmospheric Spectroscopy, Environmental Chemical Engineering, and Agricultural and Environmental Sciences.

The <u>Cultural Diversity and Communities</u> cluster covers sociology and anthropology, with modules on "Japan and Beyond," "Migration and Communities," and "Environment and Health" for deeper insights into people's beliefs and practices.

In the <u>Social Innovation and Entrepreneurship</u> cluster, students will learn to devise innovative solutions to issues such as poverty and environmental degradation through coursework on economics, management, and philanthropy. Specific courses are subcategorized in the following modules: "Economics and Management," "Social Business and Entrepreneurship," and "Philanthropy and Nonprofit Management."

Support for attaining bilingual communication skills

Multilingual education is an important factor to successfully achieve the goals of the Discovery Program. Students in the English based-track are strongly encouraged to take Japanese language classes for international students offered by the university. Students will meet regularly with their advisors to design personal study plans to meet their individual needs and long-term goals.

The faculty and the staff of the Discovery Program

The diverse and multidisciplinary nature of the Discovery Program is reflected in the program faculty, who represent six nationalities and speak ten languages. The faculty and staff will support students in their student life, including academic and career guidance, and preparation for graduate school.

Message from the Director

"We welcome students with an entrepreneurial spirit, innovative minds, and a strong will to commit themselves to intercultural and interdisciplinary collaboration."

Okayama University looks forward to welcoming young and motivated students on a new and exciting journey of multidisciplinary Discovery!



The staff of the Discovery Program



Okayama University President Hirofumi Makino with some international students at the university.

Further information about application procedures and scholarships

1. General information http://discovery.okayama-u.ac.jp/en/

2. Scholarships and financial aid http://discovery.okayama-u.ac.jp/en/admissions/scholarships/

3. Okayama University http://www.okayama-u.ac.jp/index_e.html









Okayama University Hospital successfully conducts lung transplant surgery from brain-dead donor to Japan's youngest recipient

Surgeons at Okayama University Hospital successfully transplanted both lungs donated from a boy younger than six who had been declared brain dead, into a oneyear old girl.

The surgery started shortly after nine o'clock in the morning on May 11th and was successfully completed after about six and a half hours at around three thirty in the afternoon. The girl is expected to be released from the hospital in about two months. Her parents said, "We think that the donated lungs will live on with our daughter. We hope she will grow big and enjoy the boy's share of life together with them."

Professor Takahiro Oto of the Okayama University Hospital Transplantation Center, who performed the surgical procedure, said, "I am relieved that we could continue the patient's life, linking it with the precious life of the boy who died and the wishes of his family."

Previously, the youngest lung transplant patient in Japan was a two year old boy who received parts of a lung from a living donor in September 2014; this surgery was also performed by Professor Takahiro Oto.



Professor Takahiro Oto (right) and other medical staff performing the lung transplant surgery on the one year old girl.



Okayama University Hospital

Further information

Okayama University (English page) http://www.okayama-u.ac.jp/eng/news/index_id6774.html

Okayama University (Japanese page) http://www.okayama-u.ac.jp/tp/news/news_id6701.html







Communauté Université Grenoble Alpes delegation visits Okayama University to strengthen partnership

A delegation from the Communauté Université Grenoble Alpes in France visited Okayama University President Hirofumi Makino, on 15 May 2017.

Communauté Université Grenoble Alpes and Okayama University signed a university level agreement of cooperation and student exchange appendix in September 2015.

The visiting delegation included Professor Jeanne Duvallet, Vice President in charge of International Relations at Grenoble Institute of Technology; Ms. Elisa Glangeau, Head of the International Relations Office; and Ms. Anne Fracchia, Head of the Administration of the "Collège des Ecoles Doctorales". During the meeting, President Makino said, "Achieving a fruitful academic relationship is the main objective of our partnership with Grenoble. And in the future we want to strengthen our partnership, including medicalrelated collaborations."

During their visit Professor Duvallet and her colleagues also had a meeting about research exchange with Executive Vice President for International Affairs



Group photograph to commemorative the visit.



Meeting to exchange views on future collaborations.

Hiroshi Kanzaki, Executive Vice President for Research Daiji Takeuchi, researchers from Okayama University, and exchange students from the Communauté Université Grenoble Alpes.

During the meeting, the representatives from Okayama University's explained the structure and contents of postgraduate education courses and the Discovery Program for Global Learners. The participants also took this opportunity to share opinions on future exchanges between both universities.

To date, Okayama University and the Communauté Université Grenoble Alpes have been conducting joint studies on collaborative research and student exchanges. This visit is expected to further strengthen ties between our two universities.



Further information

Okayama University (English page) http://www.okayama-u.ac.jp/eng/news/index_id6771.html

Okayama University (Japanese page) http://www.okayama-u.ac.jp/tp/news/news_id6704.html







Commemorative symposium for the opening of the Okayama University-Wayne State University Joint Research Laboratory (OU-SCEED)

Okayama University and Wayne State University (WSU), Detroit, MI, USA, have jointly launched the Okayama University-Wayne State University Joint Research Laboratory (OU-SCEED) in the WSU campus to strengthen and promote international collaborative research. A symposium to commemorative the launch of the OU-SCEED was held 20-21 February 2017.

Executive Vice President for Research Shin-ichi Yamamoto (at the time), Vice Executive Director for Research Shuichi Furuya, and Vice President for International and Interdisciplinary Graduate Programs Masaharu Seno, attended the symposium on behalf of Okayama University. WSU Provost Keith Whitfield, and Vice President for Research Stephen Lanier, and other dignitaries from WSU participated in a discussion on the education and research activities at Okayama University as well as strategies for enhancing collaborative research between the two universities.

Okayama University and WSU concluded an agreement between the universities in February 2014, and have been collaborating in education and research exchanges in the fields of medicine and biotechnology. Okayama University is internationally recognized for its cutting edge research and globally inspired education



Provost Keith Whitfield and Executive Vice President Shin-ichi Yamamoto (at the time) (left)



Research Laboratory (OU-SCEED) at the WSU campus.

programs and will continue to foster mutually beneficial relationships in research and education with highly respected universities and institutes worldwide.

Further information

Okayama University (English page) http://www.okayama-u.ac.jp/eng/news/index_id6737.html





Ninth course students of Okayama-Hue International Master's Program meet their sponsors

On 26 April 2017 eight students from Vietnam of the ninth course students of the Okayama-Hue International Master's Program-a joint program between Okayama University and Hue University, Vietnam-met the companies sponsoring their scholarships after their arrival in Japan. Speaking in Japanese, the students expressed their gratitude to their sponsors for providing them with an environment where they can devote themselves to study and described their impressions of Okayama City and Okayama University and their enthusiasm for their research during their master's program.



Commemorative photograph.

Under this program, Vietnamese students in environmental and agricultural studies receive education for a year and a half in Vietnam, after which they transfer into the master's course of the Graduate School of Environmental and Life Science at Okayama University as second-year students and will receive a master's degree upon completing the course. The scholarship links the Vietnamese students in a one-onone relationship with the supporting companies or individuals who endorse the program's principles.

Attending the ceremonial meeting were Okayama University's Executive Vice President for International Affairs Hiroshi Kanzaki, and Executive Vice President for Education Hiroshi Sano. The sponsors provided words of encouragement, saying, "We think you will find research arduous, but we hope you will visit many places in Okayama, interact with many people, and serve as a bridge between Japan and Vietnam after your return home, telling people there about the good things in Okayama. Please take care of your health and do your best during your year here."

Further information

Okayama University (English page) http://www.okayama-u.ac.jp/eng/news/index_id6770.html

Okayama University (Japanese page) http://www.okayama-u.ac.jp/tp/news/news_id6665.html







Shunsuke Shimada of the Faculty of Environmental Science and Technology selected as one of the "30 Under 30 Asia" Young Entrepreneurs

On April 13, Mr. Shunsuke Shimada, a senior in the Okayama University Faculty of Environmental Science and Technology's Department of Environmental Chemistry and Materials, was selected by the worldrenowned American business magazine Forbes as one of the "30 Under 30 Asia" young entrepreneurs in the retail and e-commerce division.

Mr. Shimada is a participant in the "Okayama University Venture Laboratory," in which students who are aiming to startup businesses have got together. Two



Mr. Shunsuke Shimada (Right)

years ago, in a nationwide business plan contest for university students, Mr. Shimada won the top prize for a plan for developing original style jeans using crowd funding to raise startup money through the Internet. In April last year, he launched the denim products planning and sales company "EVERY DENIM" with his brother. Staging try-on events for people to see how they like his jeans, Mr. Shimada has endeavored to spread the word about the allure of high-quality Kojima denim from Kurashiki City.

"After graduation, I want to develop this business model further and have this lead on to worldwide sales," Mr. Shimada said enthusiastically.

Further information

Okayama University (English page) http://www.okayama-u.ac.jp/eng/news/index_id6739.html

Okayama University (Japanese page) http://www.okayama-u.ac.jp/tp/news/news_id6653.html



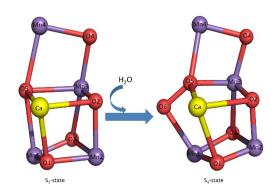




Research Highlights

Mechanism of photosynthetic water-splitting revealed by an X-ray free electron laser

Photosystem II (PSII) is a huge membrane-protein complex that catalyzes light-induced water-splitting, leading to the generation of protons and molecular oxygen. This reaction converts light-energy from the Sun into chemical energy that is required to sustain almost all living activities on Earth. The watersplitting reaction is catalyzed by a Mn4CaO5-cluster embedded within the protein matrix of PSII, and proceeds through five intermediate states called Sistates. The structures of PSII and the Mn4CaO5-cluster have been resolved with atomic resolution, however, mechanisms governing water-splitting are unclear due to the lack of intermediate structures of the enzyme.



Structural changes of the Mn4CaO5-cluster induced by two flashes illumination. S1-state: without illumination; S3-state: after two flashes illumination.

Now, Michihiro Suga, Fusamichi Akita, Jian-Ren Shen at Okayama University, and colleagues at institutes including Kyoto University, RIKEN, have clarified and resolved the structure of the Mn4CaO5cluster at S3-state—an intermediate state that exists immediately before the formation of molecular oxygen, generated by two flashes of optical illumination. They employed a pump-probe method where two laser flashes were used to pump the enzyme to the intermediate state, and the X-ray diffraction data were collected by a serial-femtosecond crystallography method using femtosecond X-ray free electron lasers (XFEL) at SACLA, Japan.

The results showed the insertion of a new oxygen atom (water molecule) close to an already existing oxooxygen termed O5, enabling the formation of molecular oxygen between O5 and the newly inserted oxygen atom (O6). This clearly demonstrated the mechanism governing the water-splitting reaction catalyzed by PSII, and provided a blueprint for design and synthesis of efficient artificial catalysts that in the future could be utilized in artificial photosynthesis to produce clean and renewable energy from the Sun.

Reference:

Authors

Michihiro Suga, Fusamichi Akita, Michihiro Sugahara, Minoru Kubo, Yoshiki Nakajima, Takanori Nakane, Keitaro Yamashita, Yasufumi Umena, Makoto Nakabayashi, Takahiro Yamane, Takamitsu Nakano, Mamoru Suzuki, Tetsuya Masuda, Shigeyuki Inoue, Tetsunari Kimura, Takashi Nomura, Shinichiro Yonekura, Long-Jiang Yu, Tomohiro Sakamoto, Taiki Motomura, Jing-Hua Chen, Yuki Kato, Takumi Noguchi, Kensuke Tono, Yasumasa Joti, Takashi Kameshima, Takaki Hatsui, Eriko Nango, Rie Tanaka, Hisashi Naitow, Yoshinori Matsuura, Ayumi Yamashita, Masaki Yamamoto, Osamu Nureki, Makina Yabashi, Tetsuya, Ishikawa, So Iwata and Jian-Ren Shen.

1-1-1 Tsushima-naka, Kita-ku, Okayama 700-8530 Japan

Title of original paper

Light-induced structural changes and the site of O=O bond formation in PSII caught by XFEL.

Journal

Nature 543, 131-135 (2017).

OKAYAMA UNIVERSITY e-Bulletin

Digital Object Identifier (DOI) 10.1038/nature21400

Journal website

http://www.nature.com/nature/journal/v543/n7643/full/nature21400.html

Affiliations

Research Institute for Interdisciplinary Science, Okayama University

Reference (Okayama University e-Bulletin) : Jian-Ren Shen's team

e-Bulletin vol.1 :

Professor Jian-Ren Shen's research clarifying the mechanism governing plant photosynthesis is chosen as one of the runners-up for 'Breakthrough of the Year' by AAAS Science for 2011. http://www.okayama-u.ac.jp/user/kouhou/ebulletin/news/vol1/news_001.html

e-Bulletin vol.1 :

Water splitting: Ultrahigh resolution data reveals reaction mechanisms http://www.okayama-u.ac.jp/user/kouhou/ebulletin/research_highlights/vol1/highlights_004.html

e-Bulletin vol.3 :

Jian-Ren Shen is awarded the prestigious 2012 Asahi Prize http://www.okayama-u.ac.jp/user/kouhou/ebulletin/news/vol3/news_001.html

e-Bulletin vol.4 :

Tofu-like crystalline catalysts: Demystifying the reaction mechanisms of photosynthesis and the potential for an unlimited source of clean energy http://www.okayama-u.ac.jp/user/kouhou/ebulletin/feature/vol4/feature_001.html

e-Bulletin vol.12 :

Damage-free structure of photosystem II and the synthesis of model compounds for water-oxidation http://www.okayama-u.ac.jp/user/kouhou/ebulletin/research_highlights/vol12/highlights_002.html

e-Bulletin vol.12 :

Exploring the structural basis for high-efficiency energy transfer in photosynthetic organisms http://www.okayama-u.ac.jp/user/kouhou/ebulletin/research_highlights/vol12/highlights_001.html



© Okayama University











Vol.19, August 2017



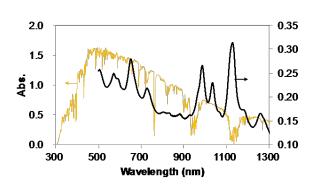
Research Highlights

Innovative carbon nanotube photocatalytic materials for efficient solar energy conversion and hydrogen production

The unique properties of semiconducting single-walled carbon nanotubes (s-SWCNTs) offer significant advantages over organic molecules, semiconducting polymers, and solid-state semiconductors for wide ranging applications. In particular, s-SWCNT are potentially highly effective active absorption layers in thin-film solar cells because the optical absorption bands—that depend on the chiral indices, (n,m)—of s-SWCNTs exhibit excellent overlap with the useful solar spectrum range of the Sun's radiation.

However, in other applications of carbon nanotubes, there have not been any reports on the use of s-SWCNTs as components of photocatalysts for splitting water into hydrogen (photocatalytic H2) although photocatalytic-based water splitting is expected to be a key technology for solar energy conversion and sustainable production of hydrogen.

Now, Yutaka Takaguchi and colleagues at Okayama University, Yamaguchi University, and Tokyo University of Science report on the observation of photocatalytic H2 evolution from water triggered by photoexcitation of s-SWCNTs.



Absorption spectrum of s-SWCNTs (black line) overlaid with solar spectrum (yellow line).

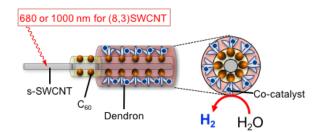


Illustration of SWCNT photocatalysts consisting of the s-SWCNT/C60 coaxial heterojunction.

The researchers fabricated a structure consisting of a s-SWCNT/C60 coaxial heterojunction by a selforganization technique using fullerodendron to make s-SWCNT act as a photocatalyst. This heterojunction was used to induce the highly efficient H2 evolution reaction from water, where the (8, 3) SWCNT/fullerodendron coaxial photocatalyst shows H2-evolving activity (QY = 0.015) upon 680-nm illumination, which is E22 absorption of (8, 3) SWCNT.

Due to strong absorption coefficients and ease of modifying s-SWCNTs, the CNT-photocatalyst could be a powerful candidate as a material for solar energy conversion and H2 production without CO2 emission.



Reference

Authors

Noritake Murakami, Yuto Tango, Hideaki Miyake, Tomoyuki Tajima, Yuta Nishina, Wataru Kurashige, Yuichi Negishi, Yutaka Takaguchi

Title of original paper

SWCNT photocatalyst for hydrogen production from water upon photoexcitation of (8,3) SWCNT at 680-nm light

Journal Scientific Reports 7, 43445 (2017).

Digital Object Identifier (DOI) 10.1038/srep43445

Journal website http://www.nature.com/articles/srep43445



Affiliations Graduate School of Environmental & Life Science, Okayama University.

Department website (Japanese page) http://www.ecm.okayama-u.ac.jp/organic/





Research Highlights

Reassessing nomenclature for 'horned turban' snail

The 'horned turban' is well known to people mainly in Japan, Korea, and China as an edible marine snail. The species of Japan and Korea was known as *Turbo cornutus* Lightfoot, 1786 (Sazae in Japanese; Fig. 1) and the Chinese one as *T. chinensis* Ozawa & Tomida, 1995 (Nankai-sazae; Fig. 2). The first literature record of *T. cornutus* was published 250 years ago (Fig. 3) and the name was globally accepted.

However, Hiroshi Fukuda, at the Graduate School of Environmental and Life Science, Okayama University discovered the existence of nomenclatural confusion for these two species. He reviewed their history since original descriptions based on examination of old literature and re-defined the identities of the two species in accordance with the *International Code of Zoological Nomenclature*.

Turbo cornutus is not identifiable with the species of Japan and Korea. It should be restricted to the species endemic to southern China and Taiwan. *Turbo chinensis* is the junior synonym and invalid.

Turbo japonicus Reeve, 1848 has long been believed to be a junior synonym of T. cornutus, but Reeve's name contains two distinctly different species. One of them is a species known only from Mauritius and Réunion, in spite of the name 'japonicus'. Subsequent authors validated the name for species in Mauritius. Another T. japonicus by Reeve is the horned turban of Japan, but this is the junior homonym of the aforementioned T. japonicus from Mauritius, and is unfortunately, invalid.

Surprisingly, the horned turban of Japan and Korea did not have any valid scientific names. Thus, *Turbo sazae* Fukuda, 2017 was proposed for this species as a new replacement name for the invalid *T. japonicus*.

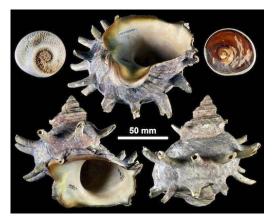


Fig. 1. Turbo sazae from Japan.



Fig. 2. *Turbo cornutus* from China. Photo by Dr Yuichi Kameda of the National Science Museum, Tokyo.



Fig. 3. The original illustration of the type specimen of *Turbo cornutus* from China, after Davila (1767).

17

The complicated history of the nomenclature for these species was caused by 'Chinese whispers' by zoologists over 250 years, partly because the species were very common for all the researchers and nobody suspected the misidentification.

Reference

Author Hiroshi Fukuda

Title of original paper

Nomenclature of the horned turbans previously known as *Turbo cornutus* [Lightfoot], 1786 and *Turbo chinensis* Ozawa & Tomida, 1995 (Vetigastropoda: Trochoidea: Turbinidae) from China, Japan and Korea

Journal

Molluscan Research (2017).

Digital Object Identifier (DOI) 10.1080/13235818.2017.1314741

Journal website

http://www.tandfonline.com/doi/abs/10.1080/13235818.2017.1314741

Affiliations

Conservation of Aquatic Biodiversity, Graduate School of Environmental and Life Science, Okayama University.

Department website (Japanese page) http://www.okayama-u.ac.jp/user/agr/profile/nougaku04_4.html

Reference (Okayama University e-Bulletin) : Fukuda's team

e-Bulletin vol.10 :

Discovery of a remarkable new species of land snail restricted to arid environments in small islands and coastal areas of the central Seto Inland Sea, Japan http://www.okayama-u.ac.jp/user/kouhou/ebulletin/research_highlights/vol10/highlights_001.html









Research Highlights

Infrared spectroscopy: Nanostructured metamaterials identify the chemical nature of tiny molecules

Infrared (IR) absorption spectroscopy plays a central role in materials and life sciences and security detection for the direct analysis of molecular fingerprints, including molecular structures, composition, and environment.

However, IR inspection of extremely small amounts of molecules is challenging due to background IR noise, hence there is a high demand for enhancing the signal quality of this technique.

Now, Atsushi Ishikawa and Kenji Tsuruta at Okayama University, in the collaboration with RIKEN, Japan,

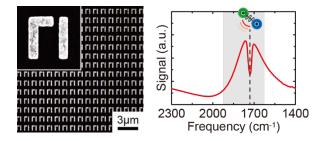


Fig.1. Researchers at Okayama University have created a new IR spectroscopic technique utilizing an engineered metamaterial to enhance the signal quality. Trials on a polymer nano-film showed a distinct IR absorption at the zeptomole level, corresponding to a few thousand organic molecules.

have developed a novel metamaterial—an engineered optical material— to manipulate IR light in the desired manner. The metamaterial could then harness the unwanted background noise, thereby dramatically boosting the ultimate sensing capability of IR spectroscopy.

The researchers came up with a unique asymmetric metamaterial design, made of 20 nm gold films on a silicon substrate (Fig.1) to rotate the polarization, that is the orientation of IR wave oscillations, during measurements. In this way, the molecules attached on the metamaterial showed different polarization from the others, and the researchers were able to detect only the target molecular signal by totally eliminating the unwanted background light.

The capabilities of the new metamaterial were tested by identifying the vibrational stretching of carbon-oxide double bonds in a poly(methyl methacrylate) (PMMA) nano-film. The measurement showed a distinct IR absorption of carbon-oxide stretching, achieving zeptomole sensitivity with a dramatically enhanced signal quality (Fig.1).

The new metamaterial approach developed by the team enabled highly-detailed IR measurements of tiny molecules at the zeptomole level, corresponding to a few thousand organic molecules. The researchers expect their new technique will open doors to the development of ultrasensitive IR inspection technologies for sophisticated applications, such as environmental monitoring and analysis of human breath for diagnostics.



Reference

Authors

Atsushi Ishikawa, Shuhei Hara, Takuo Tanaka, Yasuhiko Hayashi, and Kenji Tsuruta

Title of original paper

Cross-polarized surface-enhanced infrared spectroscopy by Fano-resonant asymmetric metamaterials

Journal Scientific Reports 7, 3205 (2017).

Digital Object Identifier (DOI) 10.1038/s41598-017-03545-8

Journal website http://www.nature.com/articles/s41598-017-03545-8

Affiliations Department of Electrical and Electronic Engineering, Okayama University.

Department website http://www.ec.okayama-u.ac.jp/~mdd/index.html





Topics

Radio Message from International Students (World Heartful Message)

Okayama University is now broadcasting an internet radio program in which international students who have come to study at Okayama University from countries all over the world talk on topics such as their life as international students, what it is like to live in Okayama City, and their research themes in English or their native languages.

Ms. Su Su Maw of the Graduate School of Health Sciences (Doctor's Course) from Myanmar talks about her research and future.

Ms. Su Su Maw (left)

Further information

https://www.youtube.com/watch?v=Q40MtmXquCs&index=2&list=PLJikPQT woCj4ggrOUY2cs_AJZleWdG4t8

Radio Message from International Students https://www.youtube.com/playlist?list=PLJikPQTwoCj4ggrOUY2cs_AJZleWdG4t8





Further information

Okayama University 1-1-1 Tsushima-naka, Kita-ku, Okayama 700-8530, Japan

Public Relations and Information Strategy E-mail: www-adm@adm.okayama-u.ac.jp Website: http://www.okayama-u.ac.jp/index_e.html

Okayama University e-Bulletin http://www.okayama-u.ac.jp/user/kouhou/ebulletin/

Okayama University Medical Research Updates (OU-MRU) http://www.okayama-u.ac.jp/eng/research_highlights/index_id56.html

About Okayama University (YouTube 1) https://www.youtube.com/watch?v=iDL1coqPRYI

Okayama University Image Movie (YouTube 2) https://www.youtube.com/watch?v=KU3hOIXS5kk

About Okayama University

Okayama University is one of the largest comprehensive universities in Japan with roots going back to the Medical Training Place sponsored by the Lord of Okayama and established in 1870. Now with 1,300 faculty and 13,000 students, the University offers courses in specialties ranging from medicine and pharmacy to humanities and physical sciences.

Okayama University is located in the heart of Japan approximately 3 hours west of Tokyo by Shinkansen.





e-Bulletin

Website



OU-MRU



YouTube 1



YouTube 2



Airport Airline Shinkansen Sappord 1h35, 2h10m Shanghai 4 3h35m Hong Kong 1h10m 2h30m × Narita Taipe Haneda Airport Okinaw Japan (日本)





"Okayama University supports the Sustainable Development Goals"

Hirofumi Makino, M.D., Ph.D. President , Okayama University