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Contents

News

Okayama University selected for the prestigious 'Program on Strengthen of Research Activity & its Promotion in Selected Universities'

Okayama University was selected on August 6 as one of only 22 institutions in Japan to receive support under the Ministry of Education, Culture, Sports, Science and Technology's 'Program on Strengthen of Research Activity & its Promotion in Selected Universities'.

Okayama University selected by Japan's MEXT for the prestigious 'Program on Strengthen of Research Activity & its Promotion in Selected Universities'.

This program was launched this year (2013) with the aim of promoting the research capabilities in limited number of universities and supporting exceptional, world class level research activities at these ones. Twenty-two universities and inter-university research institutes were selected, including Okayama University.

Under this program Okayama University will pursue an opportunity to hire talented person who can manage and support research as a staff or a technical expert to get a diverse and innovative range of activities to enhance its current excellence in research in order to establish an internationally accessible hub as a "Research University". Specifically, although Okayama University already has four URA (University Research Administrator) members, it will hire additional talented staff as URA to support the president in implementing university reform policies and managing unfavorable circumstances of research infrastructure at the university. Furthermore, some of the URA will actively analyze global trends in research and assess the University's own research capabilities in order to define core research areas for the future.

This Program will enable Okayama University to accelerate plans to provide strategic approaches to its leading researchers and enhance their outreach activities to establish Okayama University as a competitive global research university.

News

Space traveling seeds: sunflower seeds stayed in space were delivered to schoolchildren

Associate Professor Manabu Sugimoto, Institute of Plant Science and Resources, who is the Japanese coordinator of the Russian international space educational experiment 'Bion-M1', delivered space traveling sunflower seeds to Oshima Junior High School of Kasaoka City.

Associate Professor Manabu Sugimoto showing students 'space traveling seeds'.

In the experiment, the sunflower seeds prepared by elementary and junior high school students of Kasaoka and Asakuchi Cities were loaded into the Russian unmanned biosatellite Bion-M1, which was launched into orbit and returned to Earth after spending 30-days in space. The students will cultivate the 'space traveling seeds' and observe the effect of the space environment on the survival and growth of the seeds.

The packages of sunflower seeds prepared by Oshima JHS, Chuo ES, and Yorishima ES (from left to right).

Sugimoto gave a lecture to the students of Oshima Junior High School about the goals of the experiment and the significance of plant scientific research in space. Then the students received unopened packages, each containing about 70 sunflower seeds that returned from space, and planted the seeds into pots and watered them immediately.

Other schools participating in this experiment are Chuo Elementary School of Kasaoka City and Yorishima Elementary School of Asakuchi City.

Bion-M1 biosatellite launched from the Baikonur Cosmodrome in Kazakhstan on 19 April 2013 and returned to Earth on 19 May 2013.

News

International Exchange Speech Contest

The Okayama University Language Education Center held the sixth biannual international exchange speech contest on 10 July 2013 to improve mutual understanding between Japanese and foreign students, beyond nationalities, languages and cultures.

Ten students—seven foreign students from four countries, including Saudi Arabia and Indonesia, and three Japanese students— took turns to give speeches in Japanese. The foreign students talked about the importance of mutual understanding over and above words, exchanging stories laced with humor about differences in eating styles and gestures between their home countries and Japan.

The students also described how Japanese people pay a lot of attention with reference to when the characters for the word 'ambulance' are reversed to make them easier to read for drivers looking into their rear view mirrors in front of an ambulance, and stories of how people helped them with their shopping, which led to improvements in their ability to communicate.

Members of the audience—100 local residents and other students with an interest in international exchange—listened enthusiastically to the speeches.

A foreign student humorously retelling his experiences


Explaining moving incidents in Japan using photographs

News

Okayama University medical student wins gold medal at the World Junior Powerlifting Championships in Texas, USA

Okayama University 5th year medical student Yoshito Nishimura won the gold medal in all four categories of squat (S), bench press (B), dead lift (D) and total points (T) for men 66kg and under at the 31st World Junior Powerlifting Championship held in Texas, USA, 26 August to 1 September 2013., This in an outstanding first for a Japanese man to gain gold in a clean sweep of all the categories in this event with 212 contestants aged 19 to 23 from 28 countries.

A display of sheer power on the world stage.

This was the fourth time Nishimura took part in this competition having been runner-up for the last two years. At the championships he attempted a world record lift of 210.5 kg for the bench press. Although unable to break the record, he set a series of new best scores surpassing his performance at the Japanese championships held in May 2013. Nishimura says that he wants to further increase his strength so that he can go beyond the junior level and take part and win in the world championships.

Yoshito Nishimura (center) on the winner's podium receiving the overall gold medal

Meani\while, third year law student Akari Teramoto competed in the women's 57 kg and under class, giving a good performance to gain eight place. She was able to beat competitors from other countries with larger physiques than hers, showing the fruits of her constant practice.

Championship results
Men's 66kg and under: Yoshito Nishimura S.275kg (1st) / B.192.5kg (1st) / D.260kg (1st) / T.727.5kg(1st)
Women's 57kg and under: Akari Teramoto S.120kg / B.70kg / D.132.5kg / T.322.5kg

Feature

Yoshihiro Kubozono: Innovative research on organic superconductors, graphene and other functional materials

Professor Yoshihiro Kubozono

"We are using chemistry to produce new physics," says Professor Yoshihiro Kubozono at the Department of Chemistry of Okayama University. "Our recent discovery that solid picene—a wide-bandgap semiconducting hydrocarbon—doped with potassium becomes superconducting at 7 K and 18 K is a good example because physicists investigating the role of alkali dopants in organic compounds. We are the only group in the world focusing on superconducting picene." These results may find applications in the development of superconducting devices that dissipate extremely low energy.

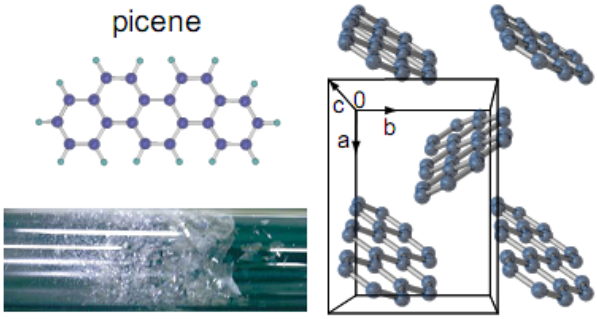


Illustration of the structure of picene and a photograph of solid picene synthesized by Professor Yoshihiro Kubozono.

Other areas of research being pursued by Kubozono and his group includes electrostatic carrier doping in two-dimensional materials such as graphene, and liquid ammonia based synthesis of metal intercalated FeSe superconductors. Electrostatic carrier doping enables the control of electrons or holes at the interface between an 'ionic liquid gate' and the underlying material—analogous to the control of carrier channels in semiconducting gated field effect transistors. "We have a wide range of activities on ionic liquid gated materials," says Kubozono. "We recently reported on why is it difficult to realize high carrier density in graphene."

Professor Kubozono is also the director of the *Research Center for New Functional Materials for Energy Production, Storage and Transport* at Okayama University. Launched in July 2010, researchers at the Center are taking an interdisciplinary approach for the development of science and technology for a sustainable low carbon society.

"The 13 internationally renowned scientists at the Center are making steady and significant

contributions to realizing our mission," says Kubozono. "An objective view of the quality of our research can be seen by our publications in high impact journals including one paper per year in *NPG Nature* since the Center was launched."

The two main areas of research are the development of organic/inorganic materials for electronics and high transmission temperature organic/inorganic superconductors for the transport and storage of energy. "We are aiming to produce solar cells with efficiencies of more than 20% using non-silicon materials, and carbon-based superconductors with high transition temperatures," says Kubozono.

The research areas being investigated at the Center include:
-High efficiency organic solar cells as replacements for conventional inorganic solar cells
-High performance solar cells produced using new electronic dielectric materials
-High performance organic field effect transistor that can be manufactured by low energy consumption process
-New nanomaterials for storing hydrogen and methane
-New types of superconductors based organic materials
-Establishing materials design policy and development of superconducting materials for the realization of high temperature superconductors
-Biological system based materials for optical-energy conversion

"This research is an interdisciplinary collaboration between the researchers affiliated with this center, "explains Kubozono. "It's a process of materials synthesis, materials evaluation and device fabrication." The Center also collaborates with overseas institutes, including the University of Durham in the UK where a member of the Center is conducting experiments on the effect of pressure on the properties of superconductors. "He is our direct link with research in the EU, says Kubozono.

Funding from the 'Program for Promoting Enhanced Research Universities' (see the News section of this edition of the Okayama University *e-Bulletin*) will be used to invite scientists from overseas to conduct research at the Center for periods of up to three months.

Other activities planned by the Center include an annual international conference: *International Workshop on Interface Science for Novel Physical Properties and Electronics*. This conference will be held on 9-11 December 2013 at Okayama University.

Recent publications by Professor Yoshihiro Kubozono

1. Superconductivity in alkali-metal-doped picene, Nature, 464, 76 (2010)
   Fabrication of high performance / highly functional field-effect transistor devices based on [6] phenacene thin films, Physical Chemistry Chemical Physics, in press (2013).
2. Parity Effects in Few-Layer Graphene, *Nano Lett*., in press (2013).
3. Superconductivity in (NH3)yCs0.4FeSe, *Phys. Rev.* B, 88, 094521 (2013).
   http://ousar.lib.okayama-u.ac.jp/metadata/51905
4. Phenanthro[1,2-b:8,7-b']dithiophene: A New Picene-type Molecule for Transistor Applications, *RSC Advances*, 3, 19341 (2013).
5. Electric double-layer capacitance between an ionic liquid and few-layer graphene, *Sci. Rep*. 3, 1595; DOI:10.1038/srep01595 (2013).
   http://ousar.lib.okayama-u.ac.jp/metadata/51906
6. Correlation between energy level alignment and device performance in planar heterojunction organic photovoltaics, *Organic Electronics*, 14, 1 (2013).

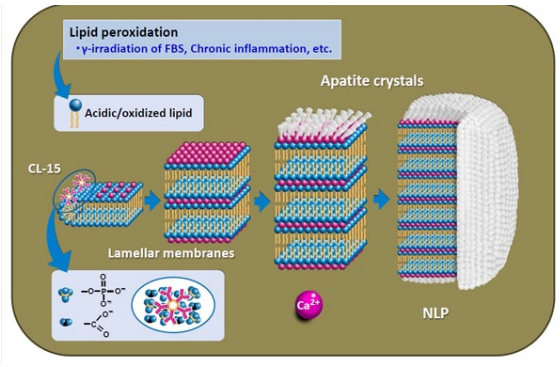
Further information

1. Professor Yoshihiro Kubozono website:
   http://interfa.rlss.okayama-u.ac.jp/l
2. Research Center for New Functional Materials for Energy Production, Storage and Transport website:
   http://www.science.okayama-u.ac.jp/RCNFM/index.html

Research Highlights

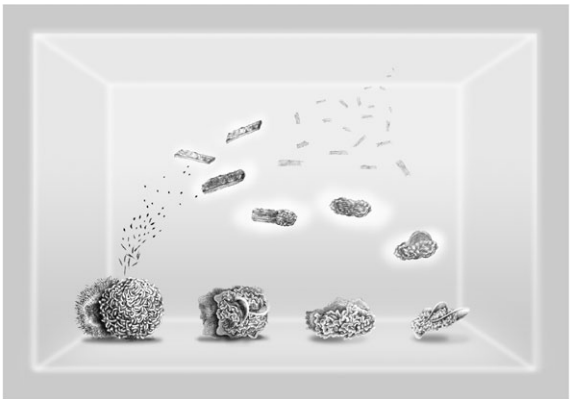
Naturally occurring nanobacteria-like particles and ectopic calcification: importance of common nanoparticle scaffolds containing oxidized acidic lipids.

Nanobacteria (NB) is the name proposed for a class of living organisms with dimensions much less than the generally accepted lower limit size for living organisms, which is about 200 nanometers for bacteria. Since their discovery by Kajander et al. in 1997, NB have undergone changes in nomenclature that include nanobacteria-like particles (NLPs), nanobes, and calcifying nanoparticles (CNP), based on their properties.



Acidic/oxidized lipids reacting with CL-15 mAb, generated by lipid peroxidation, are key elements in NLP propagation.
Stacked lipid lamellar membranes form structural scaffolds for carbonate apatite crystals in a calcium ion abundant environment.

Several *in vitro* experiments, including the failure to identify an NB genome by nucleic acid sequencing methods, have clearly ruled out their existence as bona fide living organisms. However, a number of recent studies still claim the presence of living NB to be associated with the pathogenesis and development of diverse diseases, which are related to ectopic calcification defined as inappropriate biomineralization occurring in soft tissues.



A proposed propagation cycle in the culture system, illustrating two modes of propagation. Rod-shaped NLPs were detected mainly as a floating form and spherical NLPs with characteristic apatite shells were detected as an attached form. In addition to characteristic lamellar structures composed of oxidized lipids, apatite nanocrystals from developed-spherical NLP are key elemental seeds for the acceleration of NLP propagation.

Ultrastructural and elemental analyses, combining immuno-electron microscopy with an original NLP isolate (P-17) derived from urinary stones, and an IgM monoclonal antibody (CL-15) raised against P-17 revealed that, oxidized lipids with acidified functional groups were key elements in NLP propagation [1,2]. Characteristic lamellar structures composed of oxidized lipids having calcium-chelating activity constituted structural scaffolds for carbonate apatite crystals of NLPs.

This new finding clearly explains why morphologically uniform rod-shaped NLPs appear to self-propagate like an organism and how spherical NLPs with characteristic shells develop in the culture system. During *in vitro* culture, lipid peroxidation induced by γ-irradiation of fetal bovine serum was a major cause of accelerated NLP propagation. During pathogenic processes, lipid peroxidation initated

by free radicals is responsible for the production of these oxidized lipids. We demonstrated that oxidized lipids could form a common platform for ectopic calcification in atherosclerosis-prone ($ApoE^{-/-}$) mice as a well-established disease model.

These observations indicate that naturally occurring NLP composed of mineralo-oxidized lipids complexes are generated as byproducts of chronic inflammation, rather than etiological agents.

Reference:

1. Kumon H, Matsumoto A, Uehara S, Abarzua F, Araki M, Tsutsui K *et al*.
Detection and isolation of nanobacteria-like particles from Urinary stones: Long-withheld data. *Intl J Urol* 2011; **18**: 458-65.
http://onlinelibrary.wiley.com/doi/10.1111/j.1442-2042.2011.02763.x/pdf
2. Kumon H, Matsuura E, Nagaoka N, Yamamoto T, Uehara S, Araki M *et al.* et al.
Ectopic calcification: importance of common nanoparticle scaffolds containing oxidized acidic lipids. Nanomedicine. 2013 Sep 9. pii: S1549-9634(13)00472-3. doi: 10.1016/j.nano.2013.08.010. [Epub ahead of print]

Research Highlights

How rice plants deal with environmental changes in manganese

Manganese (Mn) is an essential metal for the growth and development of plants but could also become toxic if accumulated in excessive amounts. However, the concentration of Mn in soil solution varies from sub-micromolar to hundreds of micromolar in rice fields. Therefore, rice plants must have a system to deal with such great changes of Mn.

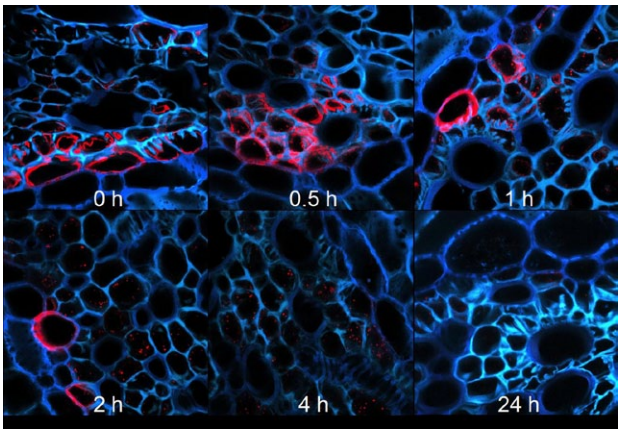


Figure caption: Rapid response of OsNramp3 protein localization to excess Mn in basal node xylem parenchyma cell. Four-week-old seedlings of WT2 grown hydroponically with 1/2 Kimura B solution were pretreated with -Mn nutrient solution for 4 days and then were transferred to nutrient solution containing 50 μM Mn. After 0 (a), 0.5 (b), 1 (c), 2 (d), 4 (e) and 24 h (f), basal stems were sampled for immunostaining of OsNramp3 (red colour). Projection image was constructed from Z-stack images at xylem of EVBs in the middle part of the basal stem. Blue colour showed cell wall autofluorescence. Scale bars, 20 μm.

Here, Naoki Yamaji and colleagues at Professor Jian Feng Ma's laboratory report the discovery that a transporter known as OsNramp3 functions as a switch in response to changes in the concentration of Mn in the environment. OsNramp3 is a plasma membrane-localized Mn transporter in the node of rice. At low Mn concentrations, OsNramp3 preferentially transports Mn to young leaves and panicles to meet the Mn requirement for growth. However, at high Mn concentrations, OsNramp3 protein rapidly degrades within few hours, resulting in an alternated distribution of Mn to old tissues although the mRNA level is unaffected by Mn level.

These results reveal the OsNramp3-mediated strategy of rice for adapting to a wide change of Mn concentrations in the environments.

Reference:

- Authors: Naoki Yamaji, Akimasa Sasaki, Ji Xing Xia, Kengo Yokosho and Jian Feng Ma
- Title of original paper: A node-based switch for preferential distribution of manganese in rice.
- Journal, volume, pages and year: Nat. Commun (2013).
- Digital Object Identifier (DOI): 4:2442 doi: 10.1038/ncomms3442
- Affiliations: Institute of Plant Science and Resources, Okayama University
- Department website: http://www.rib.okayama-u.ac.jp/plant.stress/index.html

Research Highlights

Earth science: Small effect of water on upper mantle rheology inferred from silicon self-diffusion in forsterite

Deformation experiments show that water has a great influence on the reduction of the viscosity of olivine—the most abundant mineral in the upper mantle.

However, the conditions of the deformation experiments are significantly different from those at the interior of the Earth. For example, the strain rate and stress in experiments are much higher than those in the mantle and the range of water content is limited in the deformation experiments.

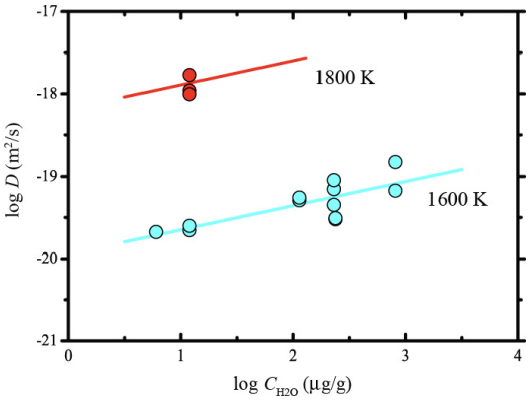


Figure caption: Silicon self-diffusivity as a function of water content at a pressure of 8 GPa.

Now, Hongzhan Fei and Tomoo Katsura at University Bayreuth, Michael Wiedenbeck at Helmholtz Centre Potsdam, and Daisuke Yamazaki at Okayama University report on the small and limited effect of water on the viscosity of olivine.

To estimate the variation of viscosity with water content the researchers determined the silicon self-diffusion coefficient of olivine (forsterite) as a function of water content ranging from <1 to 800 wt. ppm by means of high pressure experiments at 8 GP and 1600 K to 1800 K. This appraoch was used because silicon self-diffusion is the rate limiting process for deformation of olivine at high temperature as in the Earth's mantle.

The dependency of water content were determined to be $D=C_{H2O}^{1/3}$, where D and C_{H2O} are the silicon diffusivity and water content, respectively.

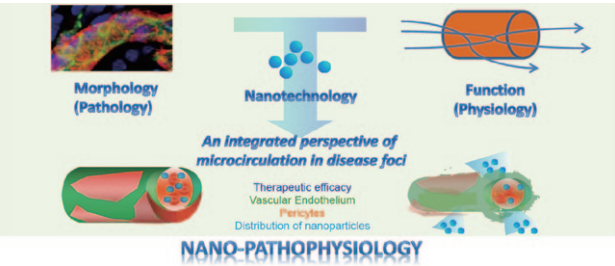
These experimental results indicate that the low viscosity zone in the asthenosphere cannot be explained by the mineral hydration.

Reference:

- Authors: Hongzhan Fei, Michael Wiedenbeck, Daisuke Yamazaki, Tomoo Katsura
- Title of original paper: Small effect of water on upper-mantle rheology based on silicon self-diffusion coefficients.
- Journal, volume, pages and year: *Nature* **498**, 213 (2013).
- Digital Object Identifier (DOI): 10.1038/nature12193
- Affiliations: University Bayreuth, Helmholtz Centre Potsdam, Okayama University

Research Highlights

Dawning of nano-pathophysiology



An example of "nano-pathophysiology". Nanotechnology can for example integrate morphological and functional aspects in therapeutic vascular biology for disease.

Nanotechnology, an emerging but still relatively new technology for biology, can provide fresh and exciting insights into the mechanism of disease, thinks Professor Mitsunobu Kano, at the Department of Pharmaceutical Biomedicine of Okayama University. He named this field of biology as "nano-pathophysiology", for the technology can visualize previously unproven relationships between morphological and functional aspects of disease, in combination with conventional methodologies. Based on his achievements in vascular biology on applying nanomedicine in cancer, Prof. Kano here describes a powerful example of potential novel insights provided by applications of nanotechnology.

The advantage of medicine of the nano scale, or nano drug delivery systems (nanoDDS), is to reduce toxicity of the "cargo" and maximize efficacy. The theoretical basis of this advantage is increased vascular permeability of disease tissue, especially in cancer, to healthy one. The effect was named as "enhanced permeability and retention (EPR) effect", by Japanese researchers in 1980s. However, biological aspects and diversity of this effect between various diseases have not been elucidated thoroughly. Also, we do not have experimental models optimized for studying this aspect: various mechanisms affecting the delivery of nanomedicine following the pathway in the body. Two-dimensional cell lines culture or animal models containing just tumor cells and leaky vessels are obviously not appropriate for this purpose. Prof. Kano therefore highlighted the need of disease models, which are clinically more relevant from the view point of "nano-pathophysiology": the models reflecting the paths for the nanoparticles to get to the target tumor cells.

In biology and medicine, novel technologies have always greatly advanced our understanding of the mechanisms of disease. Cytopathology, a major field in medicine for example, were established only after introduction of the achromatic microscope and application of chemical dyes and fixatives in the early 19th century, which allowed advances to be made in visualizing morphology and function at a microscopic level. It is therefore appropriate thinks Prof. Kano, to recall these basic advances in biomedical technology, and their provision of fresh and exciting insights into the pathophysiology of disease.

This is an article in a coming theme issue for *Advanced Drug Delivery Reviews* on "nano-pathophysiology", which Prof. Kano is guest-editing based on the point of view described above. In this review, Prof. Kano emphasizes how use of nanoparticles can open up new perspectives in analyzing the therapeutic and functional influences of microcirculation in tumors, which can further determine the refractoriness of the disease.

Reference:

Author: Mitsunobu R. Kano.
Title of original paper: Nanotechnology and tumor microcirculation.
Journal, volume, pages and year: Adv. Drug Deliv. Rev. (2013), Epub ahead of print.
Digital Object Identifier (DOI): 10.1016/j.addr.2013.08.010.
Affiliations: Department of Pharmaceutical Biomedicine, Graduate School of Medicine, Dental, and Pharmaceutical Sciences, Okayama University.
Department website: http://www.globalyoungacademy.net/membership/members/mikano-tky

Intellectual Property and Enterprise

Preparation of large porous zeolite bulk bodies

Zeolites are porous crystalline aluminosilicates with a multitude of functions—including catalysis, separation, adsorption, and ion exchange—that arise from the porous nature of the structures. Consequently, zeolites are widely used as industrial and environmental materials.

Zeolites with such functions are generally are in powder form consisting of 10 μm or smaller crystals produced by hydrothermal synthesis. To-date the synthesis of zeolitic membranes and bulky zeolites has been widely investigated to exploit the applications of the unique structures and functions of zeolites. Notably, considerable more research has been conducted on zeolitic membranes, and in contrast, bulky zeolites have been studied much less due to the difficultly in sintering zeolites.

Here, the authors describe the preparation of large porous ZSM-5 zeolite bulk bodies by the hydrothermal method. As shown in Fig. 1, porous ZSM-5 bulk bodies with sizes of the order of centimeters were successfully prepared by a one-pot hydrothermal method at 200°C for 5 days using raw materials for synthesizing ZSM-5 powder.

The resulting ZSM-5 bulk bodies have macropores with about 8 μm in diameter, and their apparent density and porosity were estimated to be about 1.5 g/cm^3 and 45 %, respectively. It is important to evaluate the mechanical properties of the ZSM-5 bulk bodes if they are to be utilized as porous bulk materials. The bulk bodies of ZSM-5were trimmed to form pellets with a diameter of 12 mm and a thickness of 5 mm. The pellets were subjected to a drilling test using a 5-mm-diameter twist drill. A doughnut-shaped pellet was non-destructively processed, as shown in Fig. 2. The bending strength of the ZSM-5 bulk bodies was about 5 MPa.

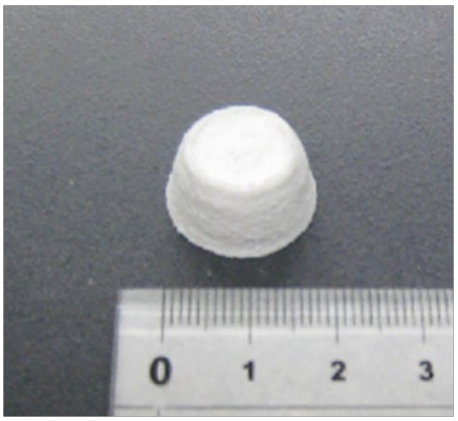


Fig.1. Photograph of as-prepared ZSM-5 bulk bodies.

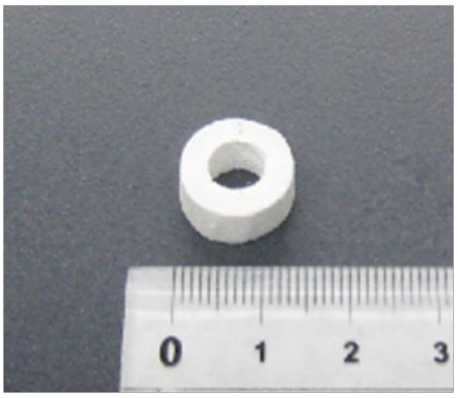


Fig. 2. Photograph of ZSM-5 bulk bodies after trimming and drilling tests.

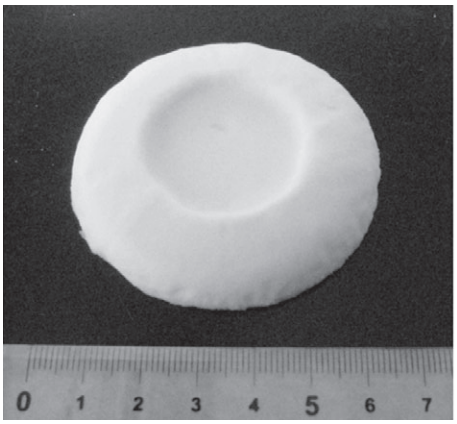


Fig. 3. Photograph of as-prepared larger ZSM-5 bulk bodies.

These results suggest that the ZSM-5 bulk bodies are suitable for use as practical porous materials. Furthermore, the preparation method found can be applied to the fabrication of larger ZSM-5 bulk bodies, as shown in Fig. 3.

Further information

Michihiro Miyake[1,2], Yoshikazu Kameshima[2], Shunsuke Nishimoto[2] and Eisaku Igi[2]
[1]Environmental Management Center, Okayama University
[2]Graduate School of Environmental and Life Science, Okayama University

Original paper: E. Igi, Y. Kameshima, S. Nishimoto, and M. Miyake, Fabrication of large porous ZSM-5 bulk bodies by a one-pot hydrothermal method, *Chem. Lett*., 41, 1414-1416 (2012).

Topics : Letters from alumni

Andi Salamah
Assistant Professor Department of Biology, Faculty of Mathematics and Natural Sciences, University of Indonesia, Indonesia.

I started my studies at Okayama University in April 1995 as a research student with a Japanese Monbusho scholarship. I spent my first six months as an Intensive Japanese Language Course's student at the University's language education center and the next 6 months as a research student before enrolling on a master's course in 1996.

I studied for my master's and doctorate degrees at the Department of Plant Pathology and Genetic Engineering, Graduate School of Natural Science and Technology, Okayama University. I was awarded my doctorate in March 2001. Life as a member of the lab at the Department of Plant Pathology and Genetic Engineering was really a great experience.

I lived in Okayama for six years and consider that Okayama is my second home or 'furusato' and feel emotionally attached to Japan's culture and nature. I enjoyed my time in Okayama with Japanese and foreign students from many countries. During my Japanese course, I was not only learning the language but also about Japanese culture, and met many foreign students who later continued their study in Kagawa, Tottori, Ehime, and Kochi prefectures. They were taking their Japanese course at the Okayama University language center because at that time Okayama University was a center of Japanese Language Courses for the Chugoku and Shikoku regions.

Studying at Okayama University also gave me a chance to become a part of the Okayama Muslim Students Association (OMSA). All these experiences are really nice memories for me and Okayama is always in my mind and my heart.

I would like to thank the Japanese Ministry of Education, Culture, Sports, Science and Technology for the scholarship that I received for my study at Okayama University. I really hope that in future that many other students from Indonesia will have the opportunity to study at Okayama University.

Andi Salamah

Members of the Genetic Engineering and Plant pathology Lab.

Dinner at Kawai Sensei's (my Japanese language course teacher) house

Topics : Okayama Travelogue

The Ushimado Marine Institute (UMI), Okayama University

The Institute is directed by Professor Tatsuya Sakamoto and offers courses in marine zoology, animal physiology, and behavioral neuro-endocrinology for students of Okayama University as well other universities in Japan. Furthermore the Institute is open throughout the year to qualified scientists to conduct their research.

The Ushimado Marine Institute (UMI), Okayama University

The Ushimado Marine Institute was founded in 1954 in Tamano City, Kagawa Prefecture in Shikoku Island, which is located in the Inland Sea of Japan (Setonaikai). In 1979 the Institute was moved to the town of Ushimado, located about 30 km from Okayama University on the northern side of the eastern region of Setonaikai.

In addition to offering student courses, the Ministry of Education, Culture, Sports, Science and Technology (MEXT) has designated the Institute as a joint use national center for 'Experimental Biology with Organisms in Areas around Inland Seas' for researchers throughout Japan.

Training vessels: The Marinus (back) and Hayate in the foreground.

The Institute is currently conducting research on regulatory biology of animals at the molecular, cellular, organismal and ecological levels; environmental adaptation of homeostatic mechanisms; and neuronal and humoral control of sexual behaviors.

The 1,380 m^2 floor space of the Institute includes a small library, a classroom, dining room, and accommodation facilities for 30 visiting scientists and about 50 students. Research and teaching facilities include aquarium; laboratories for recombinant DNA and model animals (rat, mouse, medaka, zebrafish etc.); a multi photon laser scanning microscope for morphology analysis; HPLC and PCR systems, electrophoretic apparatus for biochemistry; and scuba diving equipment for shallow and intermediate depths.

The Institute also maintains one research vessel "Marinus" and two fiber glass boats "HayateⅢ" and "Kaiba"powered by the engines.

Further information

Website: http://www.science.okayama-u.ac.jp/~rinkai/English.htm

Topics : Club Activities

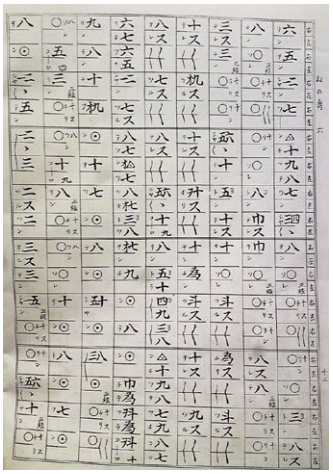
Okayama University *Hougakubu* :Traditional Japanese music club

Mayuka Nanba is a third year engineering student at the Department of Mechanical and Systems Engineering of Okayama University. And, when she is not programing robots Nanba manages the Okayama University 'Traditional Japanese Music Club—'*Hougakubu*'.

"Members of our club learn to play the koto, shamisen or shakuhatchi," says Nanba. "The Okayama University Hougakubu currently has about 100 members of whom 90% started from zero, without any previous experience of playing any of these instruments."

The Okayama University hougakubu performing at the Okayama City Culture Hall.

So how do complete beginners learn to master these challenging instruments? Nanba explains that newcomers are paired 'one–to–one' with experienced musicians. "This parent-child or 'oyako' approach is a unique and effective way of teaching complete beginners," she says. "The new members are expected to learn by themselves in their second year and in some cases to teach newcomers."



An example of the unique music score use for playing the koto.

Nanba plays the koto. "Producing high quality sounds takes a lot of practice," she confides. "Learning the musical score is also quite demanding because it is completely different from music scores for instruments such as the piano or violin."

Members of the Okayama University *Hougaku Club* give live performances at the University and at City Hall annually, and recitals at shrines and functions following requests from groups outside the University.

Nanba says that the club wants to "increase awareness of *Hougaku* both in Japan and overseas." The huge membership, including the involvement of overseas students, reflects the universal appeal of the club.

Further information

Hougakubu website: http://www.geocities.jp/okadai_hougaku/

