RITE Bioprocess featured at the 75th Session of the Council for Science and Technology Policy and at the 34th Group of Eight Summit in Toyako, Hokkaido.

Molecular Microbiology and Biotechnology Group

To combat greenhouse gas emissions that contribute to global warming, biofuels such as bioethanol have attracted worldwide attention. However, the fact that current bioethanol sources include food crops has resulted in undesirable competition between biofuel and food supply. In collaboration with Honda, RITE has developed a biofuel production system based on non-food cellulosic biomass resources such as plant stems and leaves (RITE-Honda process).

At the 75th Session of the Council of Science and Technology Policy held on May 19, 2008, the bioprocess was featured under the theme Current Science and Technology Trends: Contribution of Genetically Modified Microorganisms to the Realization of Post-Oil Society. The characteristics of the bioprocess as a production system for bioethanol and commodity chemicals using recombinant coryneform bacteria were hailed as an innovative means to a low-carbon society of the future. Subsequently, the Cabinet Office and the Ministry of Foreign Affairs sanctioned a display of the bioprocess during the 2008 G8 Summit. The then Prime Minister of Japan Yasuo Fukuda emphasized biofuels in his discussions with the other G8 leaders. The advancements of the RITE-Honda process were afforded special mention in his session with Germany Chancellor Angela Merkel (www.mofa.go.jp).

The 75th session of the Council for Science and Technology Policy Prof. Tasuku Honjo, a full-time executive member, is in the center of the photo.

Japanese-German Leaders' session

Display of RITE bioprocess at the G8 summit

RITE-HONDA Research Team won the 18th Nikkei Global Environment Award's Grand Prize

Molecular Microbiology and Biotechnology Group

Winners of the 18th Nikkei Global Environment Technology Awards were announced on October 13, 2008. The RITE-Honda Research Team (Head; Hideaki Yukawa) was awarded the Grand Prize for "Bioethanol Production from Cellulose by Simultaneous Conversion of Mixed Sugars".

In cellulosic ethanol production, the sugar extract from cellulosic biomass saccharification contains a mixture of glucose (6-carbon sugar), and xylose and arabinose (both 5-carbon sugars). The extract also contains saccharification by-products including organic acids, furan, and phenol compounds which inhibit microbial growth and metabolism, consequently retarding the fermentation of sugars. Efficient production of bioethanol calls not only for simultaneous C5 and C6 sugar fermentation, but also high tolerance of the inhibitory substances.

The microbial growth-independent RITE-Honda process utilizing recombinant coryneform bacteria is the first in the world to meet these requirements. Its demonstrably high and efficient production of ethanol from cellulosic biomass led to this award. We continue to pursue research and development in this field in order to advance the technologies underlying the process for industrial application. By so doing, we hope to contribute positively to improved global energy as well as food security while addressing the pertinent problem of global warming.

Dr. Yukawa at the award ceremony


第十八回日経地球環境技術賞
大賞
財団法人地球環境産業技術研究機構
RITE-HONDAバイオケミカルグループ
代表 湯川英明様
研究成果
「セルロースからの混合糖同時発酵によるエタノール製造技術」
あなたは世界的な環境保護の動きに呼応していち早く研究に取り組み「地球環境保全と持続的な発展に貢献する優れた成果を挙げられました
日経地球環境技術賞 審査委員会による審査の結果 頭書の賞に選定されましたのでここにその功績を称え表彰いたします
二〇〇八年十一月十二日
日本経済新聞社
社長 喜多恒雄

Global Climate & Energy Project(GCEP)

Chemical Research Group

The RITE has conducted the developmental work "Sub-nano structure controlled materials: development of innovative gas separation membranes" from the Global Climate and Energy Project (GCEP) of Stanford University, USA. In this project, the synergy of research into both organic and inorganic materials has led to innovative materials for gas separation membranes. In September 2008, RITE has received a new award for the research "Advanced CO_2/H_2 separation materials incorporating active functional agents" from GCEP.

Organic membrane

In the organic materials approach, sub-nanostructure control technologies will provide novel membranes with an excellent CO_2 separation performance for various practical gas sources.

A RITE's novel carbon membrane involving cesium atom shows good tolerance of humidity in feed gas to be of great advantage in CO_2 separation from industrial gas mixtures. Figure 1 shows carbon membranes fabricated on alumina porous substrate.

RITE is now conducting new method of creating CO_2 separation membranes using super-critical CO_2 atmosphere.

Fig.1 Carbon membrane modules incorporating cesium atom

International Workshop "Geological Storage of Carbon Dioxide" CCS Workshop 2008 – Status and Environment for the Technology of CCS–

CO_2 Sequestration Research Group

The workshop, where the current status and issues of the development of CCS technology were reported, was held at Grand Palace Hotel, Tokyo on 26th September 2008.

This workshop was organized by RITE and co-organized by Engineering Advancement Association of Japan and supported by the Ministry of Economy, Trade, and Industry of Japan, New Energy Development Organization, National Institute of Advanced Industrial Science and Technology, Japan Coal Energy Center, Central Research Institute of Electric Power Industry, The Japanese Association for Petroleum Technology, Japan Society of Energy and Resources, Society of Exploration Geophysicists of Japan and Mining and Materials Processing Institute of Japan. A total of 490 people attended from companies, research institutes and government official.

In the workshop, invited speakers from home and abroad introduced efforts toward practical application of CCS in Japan, trends of demonstration study and project of CCS in overseas, global deployment of CCS, CCS project in Australia, MASDAR CCS Project in UAE for a low carbon future, and full-scale CCS enterprise in Japan. This workshop helped to promote a much better understanding of CCS technology development.

Workshop, Grand Palace Hotel

For more information, Please visit the web site of RITE.

International Workshop "Geological Storage of Carbon Dioxide" FutureGen Workshop 2008 – CO_2 Zero Emission Coal fire Plant demonstration Project–

CO_2 Sequestration Research Group

The workshop was held at Dai-ichi Hotel, Tokyo on 25th February 2008. This workshop was organized by RITE and supported by Ministry of Economy, Trade and Industry, Ministry of Foreign Affairs of Japan, Embassy of the United States, Japan Coal Energy Center, the Institute of Energy Economics, Japan. A total of 350 people attended from companies, research institutes and government official.

In the workshop, invited speakers from home and abroad introduced "Update on the FutureGen Initiative for Near-Zero Emissions Coal", "Clean Coal Technology in Japan", "European Coal Gasification Projects", "Overview of China's IGCC and Co-production Technology Research and Development" and efforts toward practical application of CCS in Japan.

Invited speakers and researchers in Japan participated in the panel discussion about the object of large-scale CCS demonstration projects and issues to be solved. A lot of comments were made by the audience.

For more information, Please visit the web site of RITE.

Workshop, Dai-ichi Hotel,Tokyo

IIASA-RITE International Symposium

System Analysis Group

The IIASA-RITE international symposium: Global warming and sustainable development was held at Keidanren Kaikan in Tokyo on February 18, 2008. The symposium was organized by the International Institute for Applied Systems Analysis (IIASA), the Japan Committee for IIASA, the Research Institute of Innovative Technology for the Earth (RITE), and supported by the Ministry of Economy, Trade and Industry, Japan.

The objectives of this symposium were to present the findings of new project called "Alternative pathways toward sustainable development and climate stabilization (ALPS)" with the aim of the project, and to invite distinguished researchers from Japan and abroad to give a lecture on the related research, and to offer opportunities to communicate with not only researchers working on global warming, but also with participants from administrative agencies, industries and from the public.

We had an attendance of 230 people including participants from industries, ministries, universities, and research institutes, and had active discussions on global warming and sustainable development.

In the symposium, the speakers explained about the observed rise in temperature and sea level during 20th century, and projections for the rise in temperature by 1.4 to 5.8 °C relative to 1990 by the end of 21st century. In addition, it was pointed out that there were a number of people with less access to foods and electricity in the world, and suggested that a paradigm change in technologies, policy frameworks and human behaviors be necessary to build a society where sustainable development was achievable.

Symposium, Keidanren Kaikan

International Symposium on Technologies for Mitigating Global Warming -Sectoral Approach: as an Effective Measure against Global Warming-

Planning, Survey, and Public Relations Group

This symposium entitled "International Symposium on Technologies for Mitigating Global Warming -Sectoral Approach: as an Effective Measure against Global Warming-" was held on 27th of November in 2008 at Hyatt Regency Osaka in Osaka. This symposium was organized by RITE and supported by Ministry of Economy, Trade and Industry (METI) and Kinki Regional Countermeasures Promotion Meeting on Energy and Global Warming.

Symposium, Hyatt Regency Osaka

There was a high attendance of 285 people, including participants from various ministries such as METI, Ministry of Land, Infrastructure, Transport and Tourism, and Ministry of Education, Culture, Sports, Science and Technology, and also participants from embassies and foreign organizations from France and South Korea.

Under the theme of "Sectoral Approach:

as an Effective Measure against Global Warming", presentations about challenges for the approach and measures for reducing CO_2 emissions were given by the following speakers: Dr. Gwyn Prins, Professor of the London School of Economics & Political Science from United Kingdom, Mr. Duncan Macleod, Vice president of Shell International Petroleum Company Ltd. from United Kingdom, Dr. Hyeon Park, Environment Team Leader of Environment & Energy Department, POSCO from South Korea, Mr. Hiroshi Watanabe, General Manager, Siting & Environment of the Federation of Electric Power Companies, Mr. Hisatsugu Kitaguchi, Senior Manager of Global Environment Affairs Dept. Environment Affairs Div. of Nippon Steel Corporation, Mr. Michio Shinohara, General Manager, Environment & Safety Planning Office of Honda Motor Co., Ltd., and Dr. Keigo Akimoto, Group Leader of System Analysis Group of RITE. The closing speech was given by Mr. Takashi Honjo, Senior Managing Director of RITE.

The Symposium promoted greater understanding of the Sectoral approach and measures for mitigating global warming.

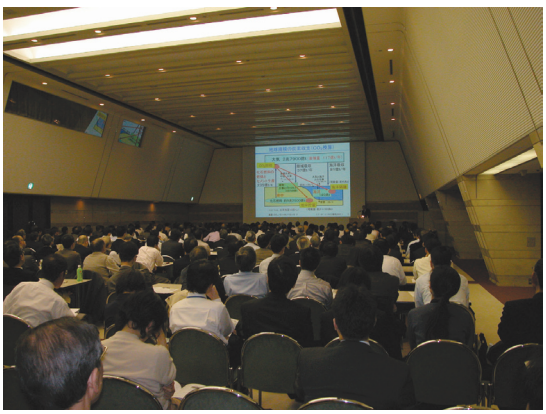
Symposium on Innovative Environmental Technologies

Research Planning Group

Symposium on Innovative Environmental Technologies was held at Mielparque-Kyoto on October 21 2008, and at Nadao Hall ,Kasumigaseki in Tokyo on December 8 2008, supported by Ministry of Economy, Trade and Industry (METI), Kyoto Prefecture and Kinki Regional Countermeasures Promotion Meeting on Energy and Global Warming..

At Mielparque-Kyoto, the outcomes of Programmed Research and Development in 2007 were presented mainly, and we had 269 participants from various field including industry, academia and government. Including the speech of Dr. Akimoto, the leader of Systems Analysis Group, the outcomes of Fundamental Research and Reading Research were presented by oral speech and poster exhibition, and the outcomes of Joint Research Program of Technological Development in the Private Sectors in 2007 were presented at the same time.

At Nadao Hall, the symposium entitled "Strategy and Perspective of Innovative Technology Development to Achieve Cool Earth 50" was held and we had 306 participants from various field including industry, academia and government. The reader of each Research Group of RITE presented the technical issue and the current world situation toward the achievement of the goal '50% reduction of global carbon dioxide emissions by 2050', and research outcomes of CCS and Bio-refinery in RITE.



Symposium, Nadao Hall

Poster exhibition, Mielparque-Kyoto

GHGT-9 Participation Report

Research Planning Group

9th International Conference on Greenhouse Gas Control Technologies (GHGT-9) was held on 16-20 November at The Omni Shoreham Hotel in Washington D.C. This is the largest international conference that focuses on mitigation technologies especially CCS (Carbon dioxide capture and storage) and are held every two years.

1. Overview of the conference

The number of the attendee was record-high 1,469 people. Since Vancouver (Canada) in 2004, the number of attendee grew by 1.5 times every time. This shows CCS as a mitigation technology has drawn much attention in the world. The largest attendee group was the US, followed by Canada, Japan, the UK, Norway, France, the Netherlands, Germany, and Australia.

After two opening plenary lectures, oral presentations were held in 66 technical sessions as follows: geological storage 23, other storage like oceanic sequestration 2, capture 17, integrated system 11, policy 8, issued forum 5. From Japan, there were two oral presentations with regard to the CO_2 trapping mechanism in Nagaoka project and CO_2 storage potential survey in Japan. Besides that, five poster presentations about geological storage, four capture, and two system analysis were carried out by RITE. The next GHGT-10 will be held in Amsterdam, the Netherlands on 19-23 September, 2010.

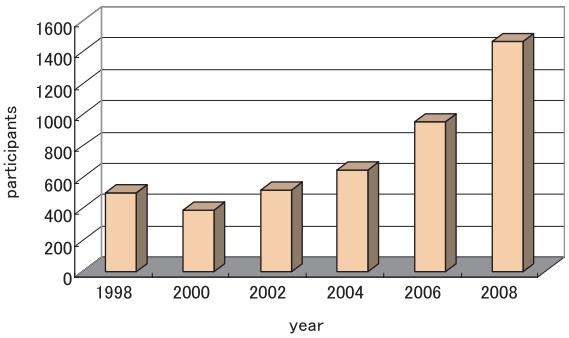


Fig. 1 Number of participants

2. Topics in each field of technical sessions

Policy and Project

CCS has become more realistic compared with two years ago when GHGT-8 was held. The importance of CCS as a CO_2 reduction technology has been well recognized and the legal standards and regulations of CCS, for example EU directive, law for the prevention of marine pollution in Japan, the Australian petroleum Act, and US EPA safe drinking water act, are being enacted. Further, in financial aspect, the EU decided to apply EU-ETS to CCS projects that start from 2013.

CCS demonstration project: The US plans to launch nine Regional Carbon Sequestration Projects, each of which will be able to capture and store more than 1 million tons of CO_2 per year. Concerning pipeline network Canada has started a project. It was announced that 21 million tons of CO_2 per year would be stored in the ground by 2012 throughout the world.

Developing countries: China promotes several CCS projects actively cooperating with the UK, the US and Australia, etc. and has launched the first post-combustion capture pilot plant.

Many CCS projects have been planned as described above but some of them have been cancelled or restructured because financial support is not sufficient. Improvements in financial systems including stabilizing EU-ETS are strongly required.

Capture

In capture sessions, noteworthy reports are (a) chemical absorption and retrofit, (b)

pilot test of chilled ammonia, and (c) pilot test of oxyfuel combustion. In the UK, a detailed study on chemical absorption has been done under the government initiative which aims to construct demonstration plants by 2014 at the latest. Many engineering studies using existing technologies have been done rather than R&D of cutting-edged capture technologies considering that application of capture technology will start from retrofit to powder-coal firing power plants in developed countries. Concerning chilled ammonia process, 30MW pilot plant test was carried out in the US and the operational results were reported, but no specific numerical value relating to superiority in energy decrease or CO_2 capture pressure was appeared. This verification seems to be done from now on. As Vattenfall's 30MW oxyfuel pilot plant in Europe was already in operation, its operational report has drawn attention but no specific data was released either. Few specific topics were presented concerning IGCC with CCS because FutureGen project is at the stage of candidate selection and is scheduled to announce the results in January, 2009. Demonstration of IGCC seems to be postponed. The EU and the US might have a strategy that they use post combustion and oxyfuel to accelerate practical application of CCS in the short term and grow IGCC with CCS as a next-generation technology.

Storage

Looking back this year's conference, GHGT-9 seemed more practical and project-oriented compared with the former conferences. In geological storage sessions, more specific discussions were presented, such as "how we should apply what we learned from mega-ton-CO_2 demonstrations to giga-ton commercial projects" or "different standard to select storage site is required between the earthquake-ridden country such as Italy and other countries". Concerning monitoring, more reports of on-site investigation and experiment were presented than before. Increasing the number of reports dealing with safety assessment and public acceptance also seems to be the key feature in this conference.

GHGT-9, The Omni Shoreham Hotel