

## 第3回 先端石炭・バイオマス利用技術に関する中国—オーストラリアシンポジウム

### 2011 Sino-Australian Symposium on Advanced Coal and Biomass Utilisation Technologies

日時：2011年12月9日～11日

場所：武漢（中国）

九州大学先導物質化学研究所 林 潤一郎

本シンポジウムは、2007年の第1回、2009年の第2回に続く「石炭およびバイオマスの先端利用技術」に関する第3回のシンポジウムです。本G-COEは、第2回と同様に本シンポジウムを協賛しました。本シンポジウムは、化石資源である石炭と再生可能資源であるバイオマスに共通する技術、そして、将来のバイオマス転換利用に適用できるブリッジ技術としての石炭利用技術、とりわけ熱化学・触媒化学転換技術の展開に焦点を定めた点が特徴です。当該分野における世界のリーディング研究者

が一堂に会して基礎研究とその将来展開を議論する点も意義あるところです。

本シンポジウムは、2011年12月9～10日に中国、武漢市において開催されました。主催は、過去2回のシンポジウムと同様、Curtin大学（オーストラリア、本G-COEの海外連携機関）および華中科技大学（中国）によります。会議代表者であるCurtin大学、Hongwei Wu教授を中心とする組織委員会が、オーストラリア、中国、アジア、欧州、アメリカ・カナダにおいて石炭・バイオマス転換利用に関する研究を推進し

ているリーディング研究者に学術論文投稿を呼びかけ、事前のqualificationによって50の論文がシンポジウム発表論文として選ばれました。これらの論文は、一会場で発表され、それゆえに、すべてのテクニカルセッションにおいて大変密度の高い議論が展開されました。

50の発表論文は、アメリカ化学会のEnergy & Fuels誌に投稿され、ピアレビューを経て37の論文が26巻1号に特別号として出版されました。本G-COEがサポートした研究からは4つの論文が掲載されました。

## 2012 Campus Asia Spring Seminar – Student Debate Session

日時：2012年3月12日～13日

場所：九州大学筑紫キャンパス

九州大学大学院総合理工学府 Jason H.C. YANG, Al-Riyami SAUSAN,

Yong HUANG, Byung-Jun KIM, Yasuhiro HINOKUMA

The student debate session was held on the second day of the 2012 Campus Asia Spring Seminar from March 12th to 13th. Kyushu University (KU), Japan, Shanghai Jiao Tong University (SJTU), People's Republic of China, and Pusan National University (PNU), Republic of Korea were the three participating Asian universities in this program. During the session, the students presented and debated about the existing energy and environmental problems in these countries. The students participated in the session have gained tremendously in many aspects. First of all, students have learnt to identify and layout solution plan efficiently. Then, students were given

opportunities to response to questions received simultaneously, which allowed the students to enhance their English communication skills. In addition, students had in depth understanding of the neighboring countries through discussing and exchanging of thoughts. Among all the students, the Global-Center of Excellence (G-COE) members benefited the most from taking the lead in hosting the session as a team.

Primary energy, electricity, and water environment problems were covered in the first part of the debate session. In the brief introduction to the primary energy consumption in the three countries, it was reported that China ranked number

one in energy consumption of 2432.2 million tons, Japan ranked 5th with 500.9 million tons, and Korea ranked 8th with 255 million tons in 2010. The energy consumption for the rest of the world was estimated to be around 8814 million tons. The main sources of energy in these countries include oil, coal, nuclear and renewable energy. China, Japan and Korea relied heavily on fossil fuels which exceeded over 50%, and nuclear energy was second to fossil fuels. During the session, many students strongly believed that renewable energy would be the future of energy, and started discussing how each country can promote this environmental-friendly energy. With fast developing economy, strategic

location, technological knowhow and capital investment, China has great potential of developing its own renewable energy. One student from SJTU commented that Japan is a developed country, and with its high technology conversion of primary energy from fossil fuels to renewable energy should be easier than any other countries. Several students from PNU proposed and agreed that biomass is the most favorable renewable energy with the current available resources and technology in Korea.

The group presenting the topic of electricity reported different forms of electricity generation in the three countries. Hydropower, thermal, nuclear and renewable energy including solar, wind, biomass, marine, geothermal and waste heat were discussed. Comprehensive comparison showed that China's thermal energy consumption was significantly higher than other countries between 2008 and 2010, while Japan has the highest consumption of nuclear energy followed by Korea. In their future energy consumption perspective, the students from KU estimated that by year 2032, Japan's thermal and nuclear energy consumption would decrease, and hydropower and renewable energy would increase the total energy consumption to 30% and 10%, respectively. The students from PNU stated that because of the rapid economic growth and improved living condition, nuclear energy is an indispensable alternative to maintain the cost and supply. The members from SJTU predicted that fossil fuels would still play a main role of power generation in China in the future. However, the increase in hydropower, nuclear and renewable energy would be an inevitable global energy trend.

The presentation on water environmental reported quality and quantity as the two main issues on the subject. The presenter specifically pointed out the importance of water quality with examples of water borne disease in the post-war Japanese society, the river pollution outbreak in Korea, and many serious water pollution incidents in China. In addition, water quantity was mentioned as a common issue in all three countries. Each country has an average water resource per capita much lower than the world's average. "Japan has been building dams and reservoirs of various sizes to tackle the problem," said a student from KU, "We are very proud to share this experience with our neighboring countries." Another student from KU said that it was not strange to find the cost of bottled water is higher than gasoline of the same volume in Japan. He added, "Japan always pays high attention to food safety, which requires more manpower, resources, and thus higher cost."

In the second part of the debate session, the topics on CO<sub>2</sub> emission and atmospheric environment problems were introduced. The fourth group summarized the recent condition of CO<sub>2</sub> emission in the three countries in recent years. The group remarked CO<sub>2</sub> emission as a problem and asked for a solution in the crowd. The discussion was quite active on this particular topic. The emission of CO<sub>2</sub> can be used directly or indirectly as an effective source of energy. However, audience agreed that the occurrence of CO<sub>2</sub> leakage might lead to a more serious problem. Opinions were divided toward the end of the discussion, yet everyone concurred that CO<sub>2</sub> emission need to be solved promptly.

The final presentation summarized the effect of

NO<sub>x</sub> and explained how NO<sub>x</sub> is responsible for the increase of O<sub>3</sub> in the three countries. The presenter then denoted a critical increase of NO<sub>x</sub> in China, while comparing a successful decrease in Korea. A student from PNU further commented that automobile is the main cause of NO<sub>x</sub> increase; therefore a traffic restriction was enforced. He explained, "The government was looking for a way to cut down commuting by automobile, and decided to enforce the No-Driving-on-Monday policy to achieve that goal." The idea was widely accepted in the audience. Some participants thought that everyone should be more proactive on protecting our environment with or without government regulations.

The student debate session has served as a bridge between the students from the G-COE program and the students from the participating universities in the Campus Asia program. We have come to learn how to work together as a team and fabricate sophisticated presentations in a timely manner. In the session, students were very involved and willing to address their concerns on environmental issues in scientific, positive and constructive ways. This certainly fulfilled the objective of the establishment of the Campus Asia program in KU, SJTU and PNU.

There will be more work in the months ahead. We will face new challenges and unforeseen tests. But thanks to the sacrifice and dedication of all the personnel and students, we have received optimistic progress in the beginning of the Campus Asia program.

