



AC21 Newsletter

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Consortium Objectives and KPIs for Academic Change

Professor John Taplin
The University of Adelaide



In one of his regular WorldWise commentaries in *The Chronicle of Higher Education* on 6 January this year, Nigel Thrift points to some of the significant changes that are occurring to what it means to be an academic in the world today. Thrift's views on the increasing trend towards cooperative approaches to research and teaching are of interest, not least because he is the Vice-Chancellor of a former AC21 member institution, the University of Warwick.

The first change noted has to do with the development of "charrettes" and research "collaboratories". The notion of a "charrette" originates from the field of architecture and design in France in the 19th century, and refers to the situation in which a group of experts works together on the solution to a common problem. The term "collaboratory" appears to have been coined about 20 years ago and subsequently defined as "a new networked organizational form that also includes social processes; collaboration techniques; formal and informal communication; and agreement on norms, principles, values, and rules" (Cogburn, 2003). Numerous examples of charrettes and research collaboratories now exist that enable their members to do research without regard to physical location through the sharing of specialized instrumentation, data, digital resources, etc. The outcome of such research cooperations should be an increase in jointly authored discoveries and publications.

The second change alluded to by Thrift has involves the influence of new educational

technology on the development of interactive learning and teaching programs. These software platforms, and the emergence of open access courseware and specific-purpose curricula for programs offered by more than a single institution, are likely to transform the delivery of higher education in the years ahead. The physical exchange of a select number of students and staff between universities will continue to be an important facet of internationalization but, regardless, the trend towards increasing exposure to global educational developments for all students and staff seems inexorable.

To a significant extent, the above-mentioned changes are already upon us. Other changes not mentioned by Thrift, such as the development of strategic partnerships between universities and key industries, could also be noted. What is the relevance of AC21 in this context? Inasmuch as membership in AC21 is determined in part by the presence of cooperative activities with other members, the Consortium should, *prima facie*, be well placed to adapt to these changes. The University of Adelaide, for example, has produced many joint publications and exchanged a substantial number of students with other AC21 universities in recent years.

And yet the question must be asked: To what extent are these bilateral collaborations attributable to our membership in the Consortium? What added value does the Consortium bring to these relationships? As AC21 approaches its second decade, I would submit that there needs to be a charter of shared objectives with respect to the research and teaching activities of its members. And, further, there needs to be a set of KPIs for the Consortium against which all its member universities can be evaluated.

The 6th AC21 International Forum in Adelaide, Australia

Natalie Kourtidis
AC21 Conference Coordinator
The University of Adelaide

The 6th AC21 International Forum will be hosted by The University of Adelaide in Adelaide, Australia from 12–14 June 2012. The theme chosen for this Forum is **Maximising the Benefits of Internationalisation**. Speakers from all parts of the world will address a variety of issues relevant to this theme, including: collaborating and capacity building on global research priorities; the internationalisation of learning and teaching; encouraging student mobility; strategies for developing intercultural competence; and making the most of intellectual property through partnerships with industry.

These are issues that we believe will be of interest to all AC21 members, and our response to them is likely to have a transformative effect on higher education and research in our respective institutions in the years ahead. In a world in which we face challenges on many fronts – climate change, natural disasters, the spread of disease, threats to security, the increasing disparity between rich and poor, etc. – the need for researchers and educators to adopt a more concerted approach towards the solution of these global problems has never been more obvious. The growing internationalisation of our universities represents an important step in this direction.

The Forum is to be held in Australia, the second time that this has happened during AC21's first decade. Australia is a country with many popular attractions for visitors from abroad, large in area but small in population, economically prosperous, and very multicultural. Almost 50 percent of its population was either born overseas or had one or both parents born overseas, according to the latest census. Asia is now the largest contributor to immigration into Australia.

Australia is also fortunate in having a well developed public university system, evidenced by the world ranking of many of its institutions and their strong commitment to the internationalisation of learning and teaching. As the third oldest Australian university and one of its most research-intensive and internationally-oriented, the University is proud to be the host for this 6th AC21 International Forum.

During the Forum, participants will have the opportunity to attend keynote addresses and other papers, and participate in discipline-specific workshops based on their research interests. We will also provide an opportunity for



Adelaide Winery

delegates to make connections with international colleagues in a relaxed atmosphere. The program will include pre-conference tours of some of the local wineries in South Australia. Other exciting activities are being planned and will be announced to AC21 members in the coming months. For the latest information and updates visit www.adelaide.edu.au/ac21conference/.

We look forward to welcoming you to Adelaide in June 2012!



The City of Adelaide



Venue: The National Wine Centre of Australia



The National Wine Centre of Australia

AC21 Special Project Fund 2011

The Synthesis of Novel Salicylaldimine Ditopic Type Ligands for the Extraction of Transition Metal Salts

Robert C. Luckay
Stellenbosch University

Leonard F Lindoy
The University of Sydney

Heinrich Lang
Chemnitz University of Technology

The mining industry normally recovers, separates and purifies metals from their ores using pyrometallurgy (heating; using lots of energy and electricity; pumping toxic fumes into the environment) or hydrometallurgical (using electrochemical properties; solubility differences in water solution; precipitation; solvent extraction) processes.

Current hydrometallurgical methods do not completely purify the water and mining streams because the anions (negatively charged ions) are still left in the solution, causing “crud” or dirt to remain behind.

A ligand is defined as a molecule capable of binding to a metal ion. Thus, in general ligands are used to separate one metal ion from another where a particular ligand complexes selectively to a particular metal ion (cation or positively charged ion).

A ditopic ligand is a ligand which is capable of forming to two different chemical entities. Hence, in this research project we made ditopic ligands for the selective removal of copper ion and nitrate ion $\{Cu(NO_3)_2\}$ from aqueous and mining streams.

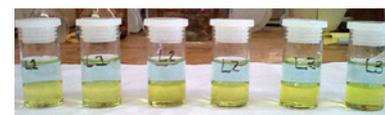
Copper is an important metal and has the following uses in industry: (i) building construction (ii) power generation and transmission (iii) electronic product manufacturing (iv) appliances and telecommunication links (v) the production of industrial machinery (vi) transportation vehicles (vii) they are also used as alloys in combination with many other metallic elements for numerous industrial applications.

The type of ligands made in this project would bind to the metal ion and to its attendant anion, thus removing cations and anions (metal salts) from industrial streams.

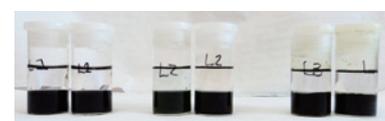
Hanna-Mari Smuts (a student at Stellenbosch

University) made three ligands, two of which are ditopic and the other capable of binding to a metal ion only. One ligand proved to be highly effective for removing copper nitrate from aqueous streams. This ligand works very fast and from the figure, we can see that in the “before” diagram, the top colour is blue (water which has copper ions dissolved in it) and the bottom colour is yellow (chloroform which has the ligand dissolved in it). After an extraction (giving the sample tubes a systematic shake) period of one hour, the dramatic colour change can be seen in the “after” diagram. This qualitatively indicates that the colour of the water has changed from blue to colourless, indicating that the ligand has complexed and removed the copper ions from the aqueous phase. A quantitative analysis was also done using an instrumental technique where the concentration of copper ion in the aqueous phase was measured before and after the extraction.

Currently, industry uses a ligand which only removes copper ion from aqueous streams. Our ligand removes both copper ion and its



Before



After

attendant anion. Hence, our ligand is better in this respect than that used in industry since it has a dual purpose. However, the current ligand used in industry can remove copper ion from aqueous streams at very low pH values. Our ligand removes 80% of the copper ion present in a mixture of metal ions at a pH value of 5.0.

Future and further work would be required to tweak our ligand so that it could extract copper ion at low pH values. This would hopefully make this type of ligand superior to that which is used in industry.

We would like to thank AC21 Special Project Fund and AC21 General Secretariat for their generous financial support.



2011 AC21 Special Project Fund

Collaborative Computational Studies of Cellulose Degradation in Ionic Liquids for Biofuel Production

Stephan Irlé
Nagoya University

Vudhichai Parasuk
Chulalongkorn University

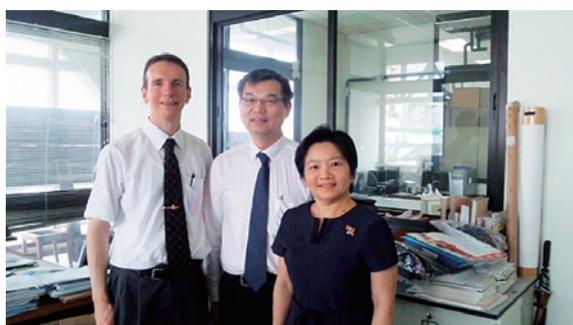
Supa Hannongbua and Waraporn Parasuk
Kasetsart University

The goal of our Special Project Fund (SPF) project was to develop a close collaboration between the theoretical chemists at the three AC21 member universities in order to theoretically assist the development of ionic liquid assisted biofuel production technology. It is clear that such a technology is invaluable for countries with negligible fossil fuel resources such as Thailand and Japan. The SPF grant from AC21 has enabled us to initiate such collaborative computational studies by supporting three workshops, one in Japan, and two in Thailand.

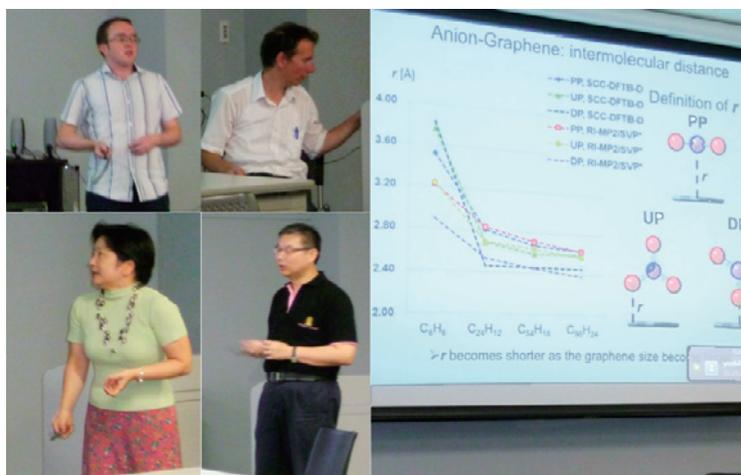
The first meeting was held from June 5–10, 2011 at Nagoya University, and the second and third were organized by Kasetsart and Chulalongkorn Universities, on October 17–18, 2011. During these workshops, attended by the PI, co-PIs, and respective group members, we defined the project activities, and exchanged experience on related projects ongoing in the partner re-

search labs. During the visit to Kasetsart University we agreed to extend our studies on green biofuel production by considering the activities of this university's "Center of Excellence – Oil Palm" (<http://www.coe-op.center.ku.ac.th>). The AC21 SPF support, allowing the PI to travel on location, was instrumental to open this promising opportunity for future collaboration. Furthermore, we used the opportunity of face-to-face discussions at these workshops to discuss joint

research between the groups of Profs. Irlé and Vudhichai Parasuk on covalent organic frameworks, which resulted in one communications paper in the Journal of American Chemical Society (*J. Am. Chem. Soc.* **2011**, *133*, 14510). Finally, we had an opportunity to discuss the initiation of a student and researcher exchange program between the Department of Chemistry of Chulalongkorn University and Nagoya University with the Chair of the department at Chulalongkorn.



At Chulalongkorn University



The workshop in Nagoya University



At Kasetsart University

The preliminary results of our SPF research activities can be summarized as follows: At Nagoya University, we benchmarked an approximate density functional theory (DFT) method, namely the density-functional tight-binding (DFTB) method, in the context of small ionic liquid clusters. This study represents a first step towards the application of the DFTB method in integrated molecular orbital studies of cellulose hydrolysis in ionic liquids in the presence of metal atoms and without. We established that a particular incarnation of the DFTB method, namely the dispersion-augmented third-order DFTB method (DFTB-3rd-D), is particularly suited to reproducing ionic liquid cluster geometries, isomer energies, as well as their electronic structures, as measured by the monopolar charge distribution. At Chulalongkorn University, the minimum energy reaction pathway of the hydrolysis of

the glucose dimer was studied using DFT methods in the gas phase. As expected, this pathway involves a very high barrier that cannot be overcome in mild reaction conditions. The situation hints at the important role of ionic liquids in this hydrolysis reaction. At Kasetsart University we developed possible model systems for lignocellulose, based on the results of previous studies reported in the scientific literature.

It is clear that the AC21 SPF project had the character of a seed fund. Since we were able to publish a joint paper and accomplished the research for another publication, we are confident of obtaining more substantial future funding for this important project from the funding agencies in Japan and Thailand. In our future work, we will perform molecular dynamics (MD) simulations of small ionic liquid clusters and analyze

the trajectories in terms of the minimum energy structures that have been identified thus far. We will then carry out steered MD simulations for the glucose dimer hydrolysis in such small ionic liquid clusters, using the integrated ONIOM(DFT:DFTB-3rd-D) methods. Regarding simulations closer to experiments, we will perform finite temperature MD simulations of lignocellulose using classical force fields with parameters adjusted for ionic liquids. We will investigate the performance of the monopolar representation of the charge distribution, and finally combine such simulations in a multiscale MD simulation, where some part of the system will be treated with the aforementioned integrated ONIOM(DFT:DFTB-3rd-D) method. The resulting atomistic information on the reaction mechanism of this complex chemical system will allow the optimization of green biofuel production in the future.

AC21 General Secretariat Visit: Gadjah Mada University and ASEAN “ICAYL” Conference

AC21 General Secretariat

The AC21 General Secretariat visited Gadjah Mada University (UGM) in Yogyakarta, Indonesia, in October 2011. This marked the first official AC21 visit to our longstanding member of ten years. The visit also coincided with the “International Conference of ASEAN Young Leaders” (ICAYL), which was being hosted by UGM during our visit. We decided to participate in the one day Open Seminar in order to learn more about ASEAN as an important regional organization, as well as to grasp the issues that its young leaders will be facing in the future. The conference was attended by over 400 students from all ten ASEAN countries, namely Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam.

At this event, many of the presenters at the conference did in fact suggest, quite emphatically, that before internationalization can, or *should* be allowed to spread further, that ASEAN identity and unity must be first reached in order to safeguard its people, culture, unique histories, local economies and political sovereignty. The Open Seminar offered us more than enough food for thought and allowed us to formulate a deeper understanding of the current problems and issues facing this distinctive and fast growing South East Asian region.



UGM Campus

On our second day in Yogyakarta, or “Jogja” as it is known locally, we headed to the UGM campus where we had the pleasure of meeting with Dr. Rachmat SRIWIJAYA, Head of the Office of International Affairs, Deputy-Head Ms. Rio MOEHKARDI, and Program Coordinator Mr. Teguh SASONGKO. A warm welcome was followed by fruitful discussions and future promises to increase UGM’s presence and standing in the AC21. The coordinator for the “International Student Summer Program DREaM Project” on social entrepreneurship also offered an overview of the UGM summer program, which is currently enjoying much success in its 3rd year. They hope to see many AC21 students apply for the pro-

gram in the coming years. (<http://oia.ugm.ac.id/dream/>)

The campus tour ended with a visit to the internationally renowned UGM Faculty of Economics and Business (English courses since 2004) where we briefly met with BM. PURWANTO, Vice Dean for Academic Affairs, Research and Community Service, and Ida NOVIYANTIE, Head of International Affairs. We learned of the extensive international network already in place and brainstormed ways in which we could include this internationally dynamic faculty in future activities of the AC21. Other departments are also making steps for increased internationalization, including courses available at undergraduate level in English at the Faculty of Medicine (1998), the Faculty of Law (2009) and International Relations (2009).

Please contact the AC21 General Secretariat if you require any additional information or would like to get in touch with representatives at Gadjah Mada University.



UGM Office of International Affairs

AC21 Member Introductions

University of Freiburg

Benjamin Gehring
Program Manager Asia



It is our pleasure to welcome all AC 21 members at the University of Freiburg (Germany). It is not only one of the oldest and most renowned higher education institutions in Germany, it is also a university with a very broad spectrum of fields of study to choose from – from natural sciences, social sciences, and humanities to life sciences, medicine, and modern technological fields. The University of Freiburg is one of the few true “comprehensive universities” that engage in instruction and research in all areas of learning.

The University consists of 11 faculties, where approx. 22,000 students and 2,500 doctoral students are enrolled, taught by more than 400 full professors. It stands for excellent teaching and research with 10 Nobel-Prize Laureates and 13 Leibniz-Prize-Winners, the highest German research award, in the last two decades. The University of Freiburg has also been one of the nine universities included in the Excellence Initiative in Germany.

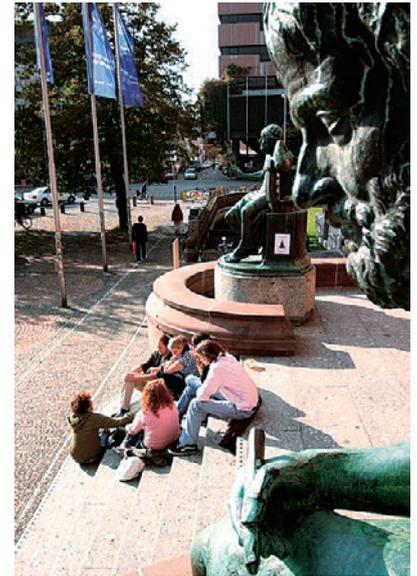
Students from all over the globe are enrolled at the University of Freiburg – a total of over 3,000 students come from outside of Germany. Moreover, many internationally acclaimed scholars teach and do research at the university.

The University of Freiburg strongly influences the atmosphere of the city. Students, lecturers and employees are very much

integrated in the daily life of the citizens. Besides the recreational value of the so-called “Green City” and its surroundings, the scholarly diversity is above all what attracts so many to the university.

The diversity of the University of Freiburg’s research landscape is matched by its level of international recognition. The University creates Windows for Research, in which the University’s own scientists can nurture the creativity and specific skills they need in order to make their long-term mark on the international scene. It sees itself as a community of people engaged in research and learning where the diverse potentials of all members are given equal recognition and encouragement. Central components of the forward-looking concept are the Freiburg Institute for Advanced Studies (FRIAS), the Centre for Biological Signalling Studies (bioss), and the Spemann Graduate School of Biology and Medicine, as well as the International Graduate Academy.

With partnerships in all continents, International Master programs, memberships in various academic consortiums such as LERU, the League of European Research Universities or AC21, the University is still



broadening its international cooperation. With the trinational campus EUCOR, for example, Freiburg students and scholars are able to study in France (Universities of Strasbourg and Mulhouse) as well as in Switzerland (University of Basel).

With a 555 year old tradition of higher education at the University of Freiburg, we are looking forward to welcome all our AC 21 members.

International Office: io@uni-freiburg.de
www.uni-freiburg.de



AC21 Member Introductions

National University of Laos

Soukkongseng SAIGNALEUTH President

Very warm greetings from the National University of Laos, Vientiane Capital, Lao PDR!

The National University of Laos, also known as NUOL, is the first public university of Lao PDR. Since its establishment in late 1995, NUOL has developed to become the leading university in the country. The aim of the establishment of NUOL was to reform and consolidate higher education in Lao PDR, and to gradually improve the country's quality of higher education, while moving towards regional and international education standards. NUOL was originally established by combining (under the Ministry of Education) 9 higher learning or post-secondary training institutions which were previously operated under various governmental departments and ministries.

Since its foundation, NUOL has had a clear vision to be not merely the leading university of the country, but also to be recognized in the region, as well as in the world. Hence, NUOL has dedicated itself to playing a leading and vital role in dynamic educational development programs in various disciplines, in order to produce sufficient, well-trained human capital through advancing knowledge and skills in response to the country's socio-economic development. Currently, the National University of Laos consists of 11

faculties, 2 institutes, 5 centers, 10 offices, 1 central library, and 1 school of talented (gifted) and ethnic minorities. NUOL's total number of staff members is 1,788 and the number of students is 40,731.

The vision of the National University of Laos is set to become a centre of excellence for higher education studies, research and cultural preservation, strengthening capacity building and human resources development with intellectual vitality, potential knowledge and skills, good attitudes, loyalty, dignity, and good health. Our graduates, after training, will be among those most sought by the best regional employers and will be expected to become leaders in their communities and accomplished professionals in their chosen fields.

The mission of the National University of Laos is to meet the development needs of Laos in a suitable, efficient and equitable manner. Our mission comprises the general goals of creating and providing training as part of the country's human resources development. Graduates are trained to become administrators, academics, and researchers equipped with high knowledge, skills, expertise in technological innovations, and the moral quality necessarily required to be good citizens and human beings. We aim to conduct and promote research in response to

the country's social and economic development, and effectively disseminate research findings and provide technical and academic services to society.

By having our vision and mission set, we are trying hard to achieve and realize our goals by creating partnerships and collaborations with universities, institutions and international organizations in countries from around the world, particularly those in the ASEAN region.

During the past decade, NUOL has established extensive academic exchanges and cooperation with a number of overseas institutions, universities, and agencies, focusing mainly on staff and student exchanges, faculty development, joint research, seminars and publications. So far, NUOL has signed agreements and memorandums of understanding (MOUs) with 164 foreign universities, institutions and organizations in 25 countries around the world.

As a member university of the AC21, we look forward to having stronger cooperation and partnerships, and working closely with our friends and member universities.

Website: www.nuol.edu.la

AC21 Member Summer School Introduction

NC STATE UNIVERSITY

North Carolina State University

The Summer Research Program at NC State provides undergraduate students an opportunity to have a hands-on research experience for six weeks during the summer. The program is designed to introduce students to different aspects of research and develop skills working in the laboratory while also gaining global perspective through cross-cultural experiences. Students are mentored

by a faculty member at NC State during the program and can either conduct an independent research project or assist with an ongoing project in the host laboratory. At the conclusion of the program a final symposium is held where students report on research outcomes. Specific areas of research include physical sciences, biotechnology, engineering, agriculture and life sciences, and environmental science. In addition to

the laboratory experience, students participate in social and cultural activities such as trips to coast of North Carolina and historic sites in Washington D.C. The program is an enriching experience for participants to gain research experience, potentially looking towards post-graduate studies as well as broadening cross-cultural understanding.

| | |
|-------------------------|---|
| Program Name | Summer Research Program (International Affairs) |
| Academics | Engineering, Agriculture, Natural Resources, Sciences and Technology |
| Education | Undergraduate (completed at least 3 years of study) |
| Languages Used | English (must prove English ability) |
| Duration | 6 weeks (usually beginning in early July) |
| Application Deadline | End of February |
| Program URL | http://oia.ncsu.edu/summer-research-program |
| Individual Applications | Ms. Anna Lamm, anna_lamm@ncsu.edu |



* Each new AC21 Newsletter will now showcase one member’s Summer/Winter or Short Stay Program in detail. We hope you will treat this new addition to our pages as an opportunity to learn more about our members.

* Please visit our updated AC21 webpage which contains detailed information on members’ Summer/Winter and Short Stay Programs at http://www.ac21.org/activities/summ_school/index.php. There are over 32 programs to choose from!

From the General Secretariat

Masahiro Abe
Headquarters for Industry, Academia and Government Cooperation,
International Cooperation Department, Nagoya University



My name is Masahiro Abe from the AC21 General Secretariat Office. Please let me introduce to you a few of my most recent thoughts.

Looking at the past activity of our consortium, founded by Nagoya University, we can see that a clear focus has been placed on International and Student World Forums, each held once every two years.

When we look at the common concerns and issues of members participating in AC21, we can see that each member has much to offer, especially in the way of experience and notable achievements.

However, nearly 10 years after the establishment of AC21, I feel as though we are being requested to organize alternative activities in addition to traditional academic exchange events. For example, one common concern for all members may be academia-industry relations.

The Times Higher Education World University Rankings, for example, adopts “Industry income” as one of its performance indicators, as a “barometer” to measure and evaluate a university’s rank and status.

Nagoya University, located in the Tokai region, Japan’s manufacturing and industrial center, has a close relationship with industry. For example, the automotive, aerospace, transportation equipment, industrial ceram-

ics, and many other machine tool industries all play a part in our industrial relations. In the automotive industry alone, we base our focus on companies which are active in this district such as Toyota, Mitsubishi, Honda, Suzuki and many others.

In July 2011, with support from the Ministry of Economy, Trade and Industry, among others, Nagoya University was able to establish the “Green Mobility Collaborative Research Center”, located on campus. The aim of this center is to move from traditional researcher-company collaboration to expand into the areas of interdisciplinary research-industry collaboration, in order to create breakthroughs that were not possible before.

Examples of these inventions are fuel cell vehicles, electric vehicles and the development of innovative batteries.

It is important for companies to consider how electricity will be obtained in the case of electric cars, as well as looking for ways to optimize general electricity usage within companies. It is essential that even things such as company transport methods and entire company infrastructure systems are considered as valid research and development issues among industry, academia and government.

It seems, upon further investigation, that many AC21 members have a strong interest in the automotive industry. We appreciate the great support by NCSU to our US-based technology transfer office, “Technology Partnership of Nagoya”, on this occasion.

The well known automotive parts maker Aisin AW Company has a factory near NCSU. There is also a VW factory near the Chemnitz University of Technology, a GM research center at Shanghai Jiao Tong University, and an excellent automotive research center facility located within the Tongji University Campus.

Additionally, many Japanese car makers are moving their operations to Thailand. This is not simply for manufacturing purposes; companies are now establishing research centers for vehicle development that strive to meet local needs, which makes me think that Chulalongkorn University may also have an interest in the automotive industry. The University of Warwick, a former member of AC21, is located in a traditional automotive manufacturing region of England and, perhaps because of this, is now conducting active research in an automotive manufacturing center.

The above examples are of course only one form of industry relations, and I am certain there are many different interests among AC21 members.

Nagoya University’s “Green Mobility Collaborative Research Center” has automotive research as one of its core activities. If any AC21 member is interested in pursuing automotive research, and after determining the specific needs of the member, we will gladly take the steps needed for creating a joint research project. I think this will be ideally geared towards one of the many different future activities for AC21.

Upcoming AC21 Activities and Events

| | | |
|------|---------------|---|
| 2012 | June | Sixth AC21 International Forum, The University of Adelaide 10th Steering Committee, The University of Adelaide Fifth General Assembly, The University of Adelaide |
| 2013 | June [TBA] | AC21 Schooling Project, [TBA] Fifth Student World Forum, Tongji University 11th Steering Committee, [TBA] |
| 2014 | [TBA] | Seventh AC21 International Forum, Stellenbosch University 12th Steering Committee, Stellenbosch University Sixth General Assembly, Stellenbosch University |
| 2015 | [TBA] | Sixth Student World Forum, The University of Strasbourg 13th Steering Committee, [TBA] |

AC21 General Secretariat Activities (2011.10 – 2012.3)

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|------|---------------|-------------------------------|
| 2011 | October 13–14 | Visit Gadgha Mada University |
| | November 24 | 100th AC21 Office Meeting |
| | December 15 | 101st AC21 Office Meeting |
| 2012 | January 19 | 102nd AC21 Office Meeting |
| | February 17 | 103rd AC21 Office Meeting |
| | March 8 | 104th AC21 Office Meeting |
| | March 27–30 | Visit Stellenbosch University |



6th AC21 International Forum



**THE UNIVERSITY
of ADELAIDE**

12-15 June, 2012
The University of Adelaide
Australia

Theme:
**“Maximizing the Benefits
of Internationalisation”**





Academic Consortium 21

AC21 Members

Chemnitz University of Technology (Germany)
Chulalongkorn University (Thailand)
Gadjah Mada University (Indonesia)
Huazhong University of Science and Technology (China)
Jilin University (China)
Kasetsart University (Thailand)
Nagoya University (Japan)
Nanjing University (China)
National University of Laos (Laos)
North Carolina State University (U.S.A.)
Northeastern University (China)
Peking University (China)
Shanghai Jiao Tong University (China)
Stellenbosch University (Republic of South Africa)
The University of Adelaide (Australia)
The University of Freiburg (Germany)
The University of Minnesota (U.S.A.)
The University of Strasbourg (France)
The University of Sydney (Australia)
Tongji University (China)

Contact Information:

AC21 General Secretariat



Furo-cho, Chikusa-ku, Nagoya 464-8601 Japan
Tel: 81-52-789-5684/5686 Fax: 81-52-789-2045
e-mail: office@ac21.org
URL: <http://www.ac21.org>

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