8\textsuperscript{TH} CHINA AUSTRALIA SYMPOSIUM ON SCIENCE AND TECHNOLOGY

supporting investment in international collaborative research, innovation and commercial cooperation

Green Materials and Recycling Economy

5-9 November 2011

Shanghai, Suzhou
People’s Republic of China
BACKGROUND
The Australia China Symposia Series – funded by the Australian and Chinese Government since 2004 and organized by the Chinese Academy of Sciences (CAS), the Australian Academy of Technological Sciences and Engineering (ATSE) and the Australian Academy of Science (AAS), has been an effective and strategic platform to build S&T partnerships between the Australian and Chinese S&T community.

The Symposia series is viewed by both the Chinese and Australian Governments as an extremely significant opportunity - not only to discuss areas of mutual interest between Australia and China but also to act as a platform to develop strategic relationships.

We wish to acknowledge the strong support provided by the Chinese Embassy in Canberra, the Department of Innovation, Industry, Science and Research, the International Office of the Chinese Academy of Sciences, the Australian Embassy in Beijing, the Australia Consulate in Shanghai and Austrade.

The Australia China Symposia series is specifically designed to allow adequate time for networking and discussion amongst participants via workshops, technical visits and exchange of ideas leading to increasing strong cooperative outcomes, including MOUs between research groups, staff and student exchange, joint publications, research projects, and the establishment of joint Australia China Centres.

The Australian delegation was led by Professor Robin Batterham AO FREng FAA FTSE, President of the Australian Academy of Technological Sciences and Engineering and Professor Suzanne Cory AC FAA, President of the Australian Academy of Sciences. Twenty Australian researchers participated in the Symposium, involving key players from Universities, industry, CSIRO and CRCs. Professor Bai Chunli, President of the Chinese Academy of Sciences was the leader of the Chinese Delegation and host. Twenty Five Chinese researchers from leading research institutes and universities were invited by the Chinese Academy of Sciences to participate.

The Academies Leadership Meeting was held on Saturday afternoon 5 November 2011 hosted by the President of the Chinese Academy of Sciences, Professor Bai Chunli, with the Presidents of AAS (Professor Suzanne Cory) and ATSE (Professor Robin Batterham) in attendance, together with the Consul General of Shanghai, Ms Alice Cawte and Ms Anne-Marie Lansdown, Head of DIISR Science and Infrastructure Division. This high level meeting provided an important opportunity for partnership discussions amongst senior participants and consolidate the relationship between the Academies.
The 8th China Australia Symposium commenced with an Opening Plenary Session with the Official Welcome/Opening Address by CAS President, Professor Bai Chunli. Keynote speeches were then presented by the Presidents of AAS and ATSE, followed by Ms Alice Cawte and Ms Anne-Marie Lansdown. This was followed by an inspiring address by Professor Lei Jiang “bio-spired interfacial materials – towards green materials and the recycling economy”. The afternoon events concluded with a Welcome Banquet hosted by CAS President, Professor Bai Chunli.
Three concurrent Workshops were held in Suzhou on 6-8 November 2011 with senior and mid-career researchers selected on the basis of the Workshop topics and their interest in strengthening S&T relationship between Australia and China.

The CAS Suzhou Institute of Nanotechnology and Nanobionics was the host venue for the 2011 Symposium. Suzhou is China’s designed ‘nanotech’ cluster to support the growth of nanotechnology and its enabling industries covering advanced materials, electronics, opto-electronics, biomedicine, manufacturing and energy/environment.

WORKSHOP 1)  Biomedical materials and devices devices
   • the development and handling of biomaterials and devices, especially at the nanoscale

WORKSHOP 2)  Recycling hard waste and liquids
   • initiatives to recycle hard and liquid waste from industry, including mining

WORKSHOP 3)  Materials for clean energy
   • new materials in battery, solar and other clean energy technologies

Details of the Australian and Chinese participants, Workshop and visit program and specific opportunities discussed at the Closing Ceremony are contained in this report.

1.5 days were set aside for visits to the CAS Suzhou Institute of Biomedical Engineering and Technology, the Shanghai Light Source, Shanghai Advanced Research Institute (SARI) and the Shanghai Institute of Ceramics (SICCAS). These technical visits provided additional insights for possible areas of future S&T cooperation and complemented the Workshops.

ATSE and AAS value the close working relationship enjoyed with the Chinese Academy of Sciences over many years, resulting in the promotion and strengthening of mutual understanding, trust and collaborations between the scientists of Australia and China via mutual visits, workshops and symposia. The Australian Academies are highly effective in using their small resources to organize a variety of successful, high impact collaborative activities with CAS. We are most grateful for the important funding support from the Department of Innovation, Industry, Science and Research,
# WORKSHOP 1: Biomedical materials and devices

**Convenors:** Professor Peter Gray and Professor Xingyu Jiang

## SUNDAY 6 NOVEMBER 2011 – SESSION 1

<table>
<thead>
<tr>
<th>Time</th>
<th>Speaker</th>
<th>Title</th>
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</thead>
<tbody>
<tr>
<td>1300</td>
<td>Professor Chengzhong Yu</td>
<td>Functional nanoporous materials in biomedical applications</td>
</tr>
<tr>
<td>1325</td>
<td>Professor Shanhong Xia</td>
<td>Biomedical and Chemical Sensors Based on Micro/Nano Technologies</td>
</tr>
<tr>
<td>1350</td>
<td>Dr Ben Muir</td>
<td>Nanostructure nanoparticles of amphiphile self-assembly materials for biomedical applications</td>
</tr>
<tr>
<td>1415</td>
<td>Dr Yilin Cao</td>
<td>Tissue engineering research: from bench to bedside</td>
</tr>
<tr>
<td>1440</td>
<td>Professor Tanya Monro</td>
<td>Nanobiophotonics: new photonics based approaches to liquid sensing</td>
</tr>
<tr>
<td>1505</td>
<td></td>
<td>Wrap up and discussions for Session 1</td>
</tr>
<tr>
<td>1515</td>
<td></td>
<td>Networking afternoon tea</td>
</tr>
<tr>
<td>1545</td>
<td>Professor Xiaogang Wu</td>
<td>Targeting polymorphic nucleic acids: modulate their biological functions and utilize these controllable conversions</td>
</tr>
<tr>
<td>1610</td>
<td>Professor Martina Stenzel</td>
<td>Nanoparticle design using polymers – a solution for every drug delivery problem</td>
</tr>
<tr>
<td>1635</td>
<td>Professor Kaiyong Cai</td>
<td>Construction of nano-biointerfaces on titanium substrates</td>
</tr>
<tr>
<td>1700</td>
<td>Dr Angus Johnston</td>
<td>Targeted Drug Delivery: Understanding cellular binding and uptake of nanoengineered capsules</td>
</tr>
<tr>
<td>1725</td>
<td>Professor Lingwen Zeng</td>
<td>Application of nano-materials in molecular diagnostics</td>
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<tr>
<td>1750</td>
<td></td>
<td>Wrap up and conclusion of Session 2</td>
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</tbody>
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## MONDAY 7 NOVEMBER 2011 – SESSION 3

<table>
<thead>
<tr>
<th>Time</th>
<th>Speaker</th>
<th>Title</th>
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<tbody>
<tr>
<td>0830</td>
<td>Dr Michael Higgins</td>
<td>Nanobionics Interface</td>
</tr>
<tr>
<td>0855</td>
<td>Professor Jianlin Shi</td>
<td>Preparation and Biocompatibility of Hollow Mesoporous silica Nanospheres</td>
</tr>
<tr>
<td>0920</td>
<td>Professor Xingyu Jiang</td>
<td>Micro/Nano-scale tools for biochemical analysis</td>
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<tr>
<td>0945</td>
<td>Workshop participants to meet</td>
<td>to discuss opportunities for mutual collaboration</td>
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</table>

Participants of Workshop 1
WORKSHOP 1 REPORT FROM PROFESSOR PETER GRAY:

This workshop brought together two excellent groups of researchers from China and Australia who represented many of the leading groups in both countries actively researching the next generation of Biomedical Materials and Devices.

The Workshop included speakers from: five Institutes of the Chinese Academy of Sciences (CAS); Shanghai’s 9th People’s Hospital; Chongqing University; five Australian Universities, and CSIRO, Australia’s National Research Organisation. The speakers addressed the application of new areas in nanotechnology and biotechnology to biomedical research, and outlined how the rapid developments in these fields are leading to an explosion of knowledge and potential new treatments in the biomedical areas. A common theme was the opportunities for ‘personalised medicine’ that these new fields are opening up, as new technologies open up the ability for early stage disease diagnosis, followed by treatment that is patient specific using a therapy which has been tailored to the specific disease and which is hopefully delivered in a targeted fashion to the pertinent part of the body.

Given the wide range of interest of the group in this general area, it was decided to breakdown potential collaborations into three main areas:

1) Nanoparticles for targeted delivery:
There was considerable interest from a number of presenters in the development of nanoparticles custom designed to deliver a therapeutic agent to a specific disease. Interest by the group covered: the design and synthesis of specific nanoparticles; research into methods which will allow such particles to be tracked once they are taken up by the desired target cells, and; the development of antibodies and antibody fragments which can be used to guide the nanoparticles to the desired cell by recognizing specific epitopes on the targets cells.

2) Research and development of bionano platforms:
During the course of the workshop it became clear that several of the groups were active in platform technology areas which will be key in the development of personalized medicine. The development of these platforms is a fertile area for future collaborations. The group identified several platform technologies where it was felt there are excellent opportunities between the participants.

3) Focussed disease research:
The group felt that there was no question that stem cells and regenerative medicine were fields that would see major development in the years ahead and where the group had considerable strengths.

In addition, it was felt that an excellent way for a really strong Sino/Australian collaboration would be to identify a disease target that is of major importance in both China and Australia, and then develop a broadly based program of research into developing better treatments for the disease which includes the development of improved early diagnosis of the disease and the development of targeted therapies for the disease. The identification of the disease for targeting could form the basis of another joint workshop.

The participants agreed to pursue options for collaborations in a number of quarters. There is
a successful CSIRO and UQ collaboration currently running with a number of groups in the Shanghai region, and this link could be built upon to form the basis for expanded collaboration.

In addition, in July 2012 the ‘1st International Conference on Bionano Innovation’ is being held in Brisbane, and Professor Chunli Bai, President of CAS, is giving a Plenary address. Professor Xingyu Jiang, co-chair of the workshop, will also be attending this Conference as will many other participants, and this will provide an excellent opportunity to discuss with Professor Bai and other colleagues the way forward for future collaborations in the areas identified.

**Workshop 1: Biomedical Materials and Devices:**

Specific areas of potential collaborations and groups that were identified:

1) **Nanoparticles for targeted drug delivery:**
   - Development of antibodies/antibody fragments for targeting nanoparticles. (2, 4, 7)
   - Synthesis of nanoparticles for drug packaging. (2, 4, 8, 9)
   - Cellular binding, uptake studies, drug release for targeted nanoparticles. (9, 10)

2) **Research and development of bionano platforms:**
   - Microfluidics (1, 2, 4)
   - Bio-analytics; molecular diagnostics (6, 11, 3, 10)
   - Nanobiophotonics and nanobionics (13, 6, 1, 12)

3) **Focussed disease research:**
   - Stem cells and regenerative medicine. (1, 2, 4, 5, 9)
   - Identification of a disease target of importance in China and Australia. (all participants)

Participants and main contacts for Workshop 1:

1) CAS National Centre for Nanoscience and Technology, (NCNST), Beijing, China (Professor Xingyu Jiang)
2) Australian Institute for Bioengineering and Nanotechnology (AIBN), The University of Queensland, Brisbane, Australia (Profs. Chengjhong Yu and Peter Gray)
3) Institute of Electronics, CAS, Beijing, China (Prof. Shanhong Xia)
4) CSIRO Molecular and Health Sciences, Melbourne, Australia. (Drs Ben Muir and Dr Calum Drummond)
5) Shanghai 9th People’s Hospital, Shanghai, China (Prof. Yilin Cao)
6) Institute for Photonics and Advanced Sensing, University of Adelaide, SA, Australia. (Professor Tanya Munro)
7) Changchun Institute of Applied Chemistry, CAS, (Prof. Xiaogang Qu)
8) Centre for Advanced macromolecular Design (CAMD), University of New South Wales, Australia. (Professor Martina Stenzel)
9) Chongqing University, China (Professor Kaiyong Cai)
10) Nanostructured Interfaces and Materials Group, University of Melbourne, Australia (Dr Angus Johnston and Professor Frank Caruso)
11) Guangzhou Institutes of Biomedicine and Health, CAS, China (Professor Lingwen Zeng)
12) Intelligent Polymer Research Institute, University of Woollongong, Australia (Dr Michael Higgins and Professor G. Wallace)
13) – Shanghai Institute of Ceramics, CAS, China (Professor Jianlin Shi)
WORKSHOP 2 REPORT FROM MR RON HARDWICK AND PROFESSOR YONGGUAN ZHU

WORKSHOP 2 PRESENTATIONS: RECYCLING HARD AND LIQUID WASTE
Convenors: Mr Ron Hardwick (Australia) and Professor Yongguan Zhu (China)

SUNDAY 06 NOVEMBER 2011 – Session 1

1300-1315 Prof. Yong-Guan Zhu Chinese Perspective and Overview
1315-1335 Mr Ron Hardwick Overview on Australia: Recycling-the way of the future
1335-1405 Prof. Feng Zhao China Application of bio- electrochemistry techniques in wastewater recycle
1405-1435 Prof. Ravi Naidu Solid and liquid waste management-current state of play and innovative solutions
1435-1505 Prof. Guoying Zhao China Cleaner catalysis in Ionic Liquids
1505-1530 Wrap up and discussion for Session 1
1540-1545 Networking morning tea

Session 2

1545-1615 Professor Veena Sahajwalla Recycling Plastics and Rubber Tyres as a Resource for EAF Steelmaking
1615-1645 Professor Jianxiong Zeng China (did not present) Optimisation of value added product from waste fermentation via metabolic strategy
1645-1715 Mr David Singh Household Waste—the Urban Mine
1745-1815 Conclusion of Workshop Sessions

MONDAY 07 NOVEMBER 2011 – Session 3

0830-0900 Prof. Yujie Feng China Key Materials and Performance of MFCs for Wastewater Treatment
0900-0930 Dr Habib Zughbi Recycling of solid waste streams At Port Kembla steelworks (PKSW)
0930-1000 Prof. Fushen Zhang China Nano-materials developed from e-waste
10:00-1100 Workshop participants to meet in Workshop groupings to discuss opportunities for mutual collaboration
WORKSHOP 2 DISCUSSIONS:
Summary of the workshop on Recycling hard and liquid waste by Professor Zhu Yong-guan
Waste can be recycled into energy and materials (for buildings, environmental treatment and fertilizers for food production and landscaping). This workshop comprised 11 presentations, covering a wide range of topics, including fundamental understanding (bio-electrochemistry, cleaner catalysis and biotechnology), technological integration (utilization of industrial biomass, e-waste and urban mine) and industrial applications (waste management in steelworks, recycling of plastics and rubber etc). Participants were of the opinion that recycling happens locally, but has global impacts, such as greenhouse gas emission and resource efficiency. Through the discussion over the two overviews from the conveners, we agreed that recycling is important for the sustainable development of both Australia and China, and that recycling is implemented in value-added and environmentally friendly manners, and that it is critical in develop appropriate business model for the implementation of recycling at different scales. During the workshop, there were intensive discussions on possible topics of collaboration.

PRIORITY APPROACHES FOR COLLABORATION- Opportunities for future cooperation and possible follow-up:
1. To apply for a joint research center for waste recycling through the special fund between China and Australia (Australia China Science and Research Fund);
2. Urban mine: Mr David Singh and Professor Yongguan Zhu is in discussion of developing a business model for collaboration between scientists and industries, Mr Singh is preparing some documents about the industrial package, and Prof Zhu is seeking collaboration with local governmental agencies in China;
3. CAS Institute of Process Engineering has invited Dr Habib Zughbi to visit to discuss topics of mutual interest e.g carbon capture and storage. Baosteel will arrange a return visit to Australia of Chinese participants who are interested in topics relevant to iron and steel making.
4. E-Waste: Professor Veena Sahajwalla, Director of the Centre for Sustainable Materials Research & Technology at the University of New South Wales will host a return visit of Professor Fushen Zhang, Research Centre for Eco-Environmental Sciences, the Chinese Academy of Sciences to UNSW, visited Sydney from 12-16 December, 2011. Purpose of the visit: Professor Sahajwalla and her Team at SMaRT Centre hosted various meetings and discussions with Professor Zhang to develop and build collaborative relationship and capacity building in the area of e-waste. Professor Zhang has invited Professor Sahajwalla to visit Beijing in early 2012.
5. E-waste. Given the large number of back yard activities focusing on valuable metal extraction from e-wastes using corrosive solutions and solvents, Professor Naidu suggested the need for a common centre that accepted e-wastes for recycling. He thought that funding bodies such as AusAid may be approached for support. Demonstration of technologies in environmentally friendly ways of E-waste management can be done in China;
6. Biomass waste to bio-energy and other products: Professor Guangwen Xu made a comprehensive presentation on the systems approach to the utilization of industrial biomass waste. This system is potentially useful in urban waste management, and can be shared by both sides, and could be an area of joint research project in the future.
### Workshop 3: Materials for clean energy

**Conveners:** Professor Chennupati Jagadish FAA FTSE and Professor Hui Yang

#### SUNDAY 6 NOVEMBER 2011  SESSION 1

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<tr>
<th>Time</th>
<th>Speaker</th>
<th>Topic</th>
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<tbody>
<tr>
<td>1300-1330</td>
<td>Prof. Yi-Bing Cheng</td>
<td>Processing of flexible dye sensitized solar cells on plastic substrates</td>
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<tr>
<td>1330-1400</td>
<td>Prof. Honghe Zheng China</td>
<td>Interactions between active material, conductive nano-carbon and polymeric binder in lithium-ion battery cathode laminate</td>
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<tr>
<td>1400-1430</td>
<td>Prof. Paul Meredith</td>
<td>Organic solar cells: Beyond the shockley- queisser imit</td>
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<tr>
<td>1430-1515</td>
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<td>Wrap up and discussion for Session 1</td>
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**SESSION 2**

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<tr>
<th>Time</th>
<th>Speaker</th>
<th>Topic</th>
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<tbody>
<tr>
<td>1515-1545</td>
<td></td>
<td>Networking afternoon tea</td>
</tr>
<tr>
<td>1545-1615</td>
<td>Professor Hua Kun Liu</td>
<td>Nanomaterials for next generation lithium rechargeable batteries</td>
</tr>
<tr>
<td>1615-1645</td>
<td>Professor Yuguo Guo China</td>
<td>Nanocable-like electrode materials for better lithium-ion batteries</td>
</tr>
<tr>
<td>1645-1715</td>
<td>Associate Professor Lianzhou Wang</td>
<td>New nanostructured materials for efficient photo-electrochemical energy conversion</td>
</tr>
<tr>
<td>1715-1745</td>
<td>Professor Ning Dai China</td>
<td>Thin film solar cells: an overview of existing problems</td>
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<tr>
<td>1745-1830</td>
<td></td>
<td>Conclusion of Workshop Sessions</td>
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#### MONDAY 7 NOVEMBER 2011  SESSION 3

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<thead>
<tr>
<th>Time</th>
<th>Speaker</th>
<th>Topic</th>
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<tbody>
<tr>
<td>0830-0900</td>
<td>Professor Gavin Conibeer</td>
<td>Advanced photovoltaic approaches for low Cost per watt solar cells</td>
</tr>
<tr>
<td>0900-0930</td>
<td>Professor Jianrong Dong China</td>
<td>High-efficiency multiple junction solar cells</td>
</tr>
<tr>
<td>0930-1000</td>
<td>Professor Xudong Xiao China</td>
<td>Recent progress of Cu(InGa)Se₂ solar cells in CUHK/SIAT</td>
</tr>
<tr>
<td>1000-1100</td>
<td>Workshop participants</td>
<td>Discuss opportunities for mutual collaboration</td>
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Workshop 3 participants
WORKSHOP 3 REPORT FROM PROFESSOR C JAGADISH

I was invited by the Australian Academy of Science (AAS) and the Australian Academy of Technological Sciences and Engineering (ATSE) to be the Australian convenor of the workshop *Materials for Clean Energy*. My Chinese co-convenor was Professor Hui Yang, Director of the Suzhou Institute of Nano-tech and Nano-bionics, CAS.

I have participated in previous Australia-China workshops and symposia organised by the two Academies and I have been impressed by the opportunities that these meetings provide to establish and strengthen collaborations not just between Australian and Chinese researchers but also between Australian researchers themselves.

At the workshop presentations were made by five Australian and five Chinese researchers respectively. (See list of participants.) All presentations were excellent and provided a good overview of research being conducted in both countries in the area of materials related to clean energy applications. Question and Answers sessions and lengthy discussions followed each presentation.

Networking by workshop members was highly successful, and a number of research collaborations are now being planned. This workshop offered a forum to meet Chinese colleagues and discuss potential collaborations in areas such as third generation photovoltaics, organic solar cells and batteries. As a result of this meeting new links have been forged and Australian participants have extended invitations to their Chinese colleagues to make return visits to their home institutions in Australia. Chinese and Australian workshop participants have also developed proposals for the Australia-China Science and Research Fund (ACSRF).

China has been attracting Chinese researchers working overseas to go back to China by creating specially appointed professorial positions in Chinese universities and institutions in order to facilitate collaborations between Chinese and overseas scientists. For example, Prof Yi-Bing Cheng from Monash University is one of those who participated in the workshop and who is also a part time Professor at Wuhan National Laboratory for Optoelectronics. Involvement by researchers such as Professor Cheng is invaluable as they understand how research works in both countries.

Site visits to high-class institutes in Shanghai and Suzhou showcased the capabilities of impressive facilities being developed and built in China.

The five Australian workshop participants have submitted short reports (attached). These provide detail of outcomes from their participation in the workshop.

The Academies and the Chinese Academy of Sciences did an outstanding job in putting together this event. Special thanks are due to Ms Nancy Pritchard, Ms Elizabeth Meier and Ms Anne Houston for their excellent efforts in coordinating Australian delegation and logistics of organising the workshops and associated visits. Support by the Dept. of Innovation, Industry, Science and Research was greatly appreciated and should be acknowledged.
## VISIT PROGRAM

### SATURDAY 05 NOVEMBER 2011 (SHANGHAI)

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>1020</td>
<td>Australian delegation arrives in Shanghai on flight KA802, transfer to accommodation, buffet lunch</td>
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<td></td>
<td>Hotel: <em>Xin An Zuo</em> City Hotel Shanghai</td>
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<td>1500 Keyuan Road, Zhangjiang High-tech Park, Shanghai. Telephone: 021-61651111</td>
</tr>
<tr>
<td>1600-1645</td>
<td>CAS/AAS/ATSE Academies Leadership Meeting</td>
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<tr>
<td></td>
<td>Venue: <em>Xin An Zuo</em> City Hotel Shanghai</td>
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<tr>
<td></td>
<td>Professor Robin Batterham AO FREng FAA FTSE, Professor Suzanne Cory FRS FAA</td>
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<td></td>
<td>Australian Consul, Ms Alice Cawte and Ms Anne-Marie Lansdown, DIISR</td>
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<tr>
<td></td>
<td>Host: Professor Bai Chunli</td>
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<tr>
<td></td>
<td>With AAS, ATSE and CAS International Staff</td>
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<tr>
<td>1600-1645</td>
<td>Registration &amp; Afternoon Tea</td>
</tr>
<tr>
<td></td>
<td>Venue: <em>Xin An Zuo</em> City Hotel Shanghai</td>
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<tr>
<td></td>
<td>Opening Ceremony (Venue: <em>Xin An Zuo</em> City Hotel Shanghai)</td>
</tr>
<tr>
<td>1655-1705</td>
<td>Official welcome by Professor Bai Chunli, President of CAS</td>
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<tr>
<td>1705-1725</td>
<td>Keynote Speeches by Presidents of AAS and ATSE</td>
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<tr>
<td>1725-1745</td>
<td>Address by the Australian Consul General in Shanghai, Ms Alice Cawte</td>
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<td></td>
<td>Address by Branch Manager, National Collaborative Research Infrastructure Strategy, DIISR, Ms Anne-Marie Lansdown</td>
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<tr>
<td>1745-1825</td>
<td>Plenary addresses from China and Australia to set the country scene</td>
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<tr>
<td>1825-1830</td>
<td>Photo opportunity</td>
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<tr>
<td>1830-2000</td>
<td>Welcome Banquet hosted by President of the Chinese Academy of Sciences</td>
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<td></td>
<td>Professor Bai Chunli</td>
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### SUNDAY, 06 NOVEMBER 2011 (SHANGHAI TO SUZhou)

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<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>0700-0745</td>
<td>Breakfast</td>
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<tr>
<td>0745</td>
<td>Check out of hotel and meet in lobby</td>
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<tr>
<td>0800-1030</td>
<td>Travel to Suzhou</td>
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<tr>
<td>103 0-1130</td>
<td>Technical Visit to Suzhou Institute of Nanotechnology &amp; Nano-bionics, CAS</td>
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<tr>
<td>1130-1200</td>
<td>Registration and Check-in Hotel: <em>Jinling Guanyuan</em> International Hotel</td>
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<td>No.168 Cui Wei Street Suzhou Industrial park. Suzhou</td>
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<tr>
<td>1200-1300</td>
<td>Buffet Lunch</td>
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<tr>
<td>1300-1500</td>
<td>Commencement of Concurrent Workshops: - Session 1: 4 presentations</td>
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<tr>
<td></td>
<td>WORKSHOP 1) Biomedical materials and devices</td>
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<td>- the development and handling of biomaterials and devices, especially at the nanoscale</td>
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<td>WORKSHOP 2) Recycling hard and liquid waste</td>
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<td>- initiatives to recycle hard and liquid waste from industry, including mining</td>
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<td>WORKSHOP 3) Materials for clean energy</td>
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<td>- new materials in battery, solar and other clean energy technologies</td>
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<tr>
<td>1500-1515</td>
<td>Wrap up and discussion for Session 1</td>
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<tr>
<td>1515-1545</td>
<td>Tea Break( Workshop participants have individual roundtable discussion on possible areas of cooperation )</td>
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<tr>
<td>1545-1745</td>
<td>Concurrent Workshops Sessions1,2,3 – Session 2: 4 presentations</td>
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<tr>
<td>1745-1900</td>
<td>Conclusion of Workshop Sessions</td>
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<tr>
<td>1900-2000</td>
<td>Networking Dinner</td>
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### MONDAY 7 NOVEMBER 2011 (SUZHOU)

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<tr>
<th>Time</th>
<th>Activity</th>
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<tbody>
<tr>
<td>0700-0830</td>
<td>Buffet Breakfast</td>
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<tr>
<td>0830-1000</td>
<td>Concurrent Workshop Sessions 1,2,3 – Session 3: 3 presentations</td>
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<tr>
<td>1000-1100</td>
<td>Workshop participants to meet in Workshop groupings to discuss opportunities for mutual collaboration</td>
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<tr>
<td>1100-1215</td>
<td>All participants to meet for reporting on mutual collaboration</td>
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<td>Australian and Chinese Convenors to report Wenyuan function room</td>
</tr>
<tr>
<td>1215-1230</td>
<td>Close of symposium Wenyuan function room</td>
</tr>
<tr>
<td>1230-1330</td>
<td>Buffet Lunch</td>
</tr>
<tr>
<td>1330-1700</td>
<td>Australian Delegation to undertake technical visit program at the Suzhou Institute of Biomedical Engineering and Technology, CAS. Chinese delegation checkout, ground transportation to Suzhou railway station or Shanghai Pudong/Hongqiao/Wuxi Airport</td>
</tr>
<tr>
<td>1800-2000</td>
<td>Networking Dinner – overnight in Suzhou</td>
</tr>
</tbody>
</table>

### TUESDAY 8 NOVEMBER 2011 (Suzhou and Shanghai)

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>0700-0745</td>
<td>Breakfast</td>
</tr>
<tr>
<td>0745</td>
<td>Check out of hotel in Suzhou and meet in lobby</td>
</tr>
<tr>
<td>0800</td>
<td>Cultural program in Suzhou for Australian Delegation</td>
</tr>
<tr>
<td>1730</td>
<td>Australian Delegation arrive in Shanghai. Accommodation: Xin An Zuo City Hotel Shanghai 1500 Keyuan Road, Zhangjiang High-tech Park, Shanghai Telephone: +86 021-6165111</td>
</tr>
<tr>
<td></td>
<td>Evening at leisure – additional networking opportunities</td>
</tr>
</tbody>
</table>

### WEDNESDAY 9 NOVEMBER 2011 (SHANGHAI)

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>0700-0745</td>
<td>Breakfast</td>
</tr>
<tr>
<td>0745</td>
<td>Check out of hotel and store luggage. Australian Delegation to meet in lobby</td>
</tr>
<tr>
<td>0745-2000</td>
<td>Technical visit programs for Australian participants in Shanghai:</td>
</tr>
<tr>
<td>All Day</td>
<td>Shanghai Light Source</td>
</tr>
<tr>
<td></td>
<td>Shanghai Advanced Research Institute (SARI) and the Shanghai Institute of Ceramics (SICCAS).</td>
</tr>
<tr>
<td></td>
<td>These technical visits provided additional insights for possible areas of future S&amp;T cooperation and complemented the Workshops.</td>
</tr>
<tr>
<td>2000</td>
<td>Australian Delegation depart Shanghai Airport on QF130 or undertake additional networking opportunities</td>
</tr>
</tbody>
</table>
Three areas of potential collaborations were identified:

1) **Nanoparticles for targeted drug delivery:**
   - Development of antibodies/antibody fragments for targeting nanoparticles. (2, 4, 7)
   - CSIRO is utilising the ‘cubosome™’ technology to produce nanoparticles for therapeutic applications. These nanoparticles are lipid based and self-assemble into complex three dimensional structures. Currently the technology has shown promise as chemotherapeutic, siRNA delivery and medical imaging vehicles (Muir et al. ‘Metal-free MRI visible theranostic lyotropic liquid crystal nitrooxide-based nanoparticles” *Biomaterials*, accepted; Muir et al. Submitted ‘Glycerol Monooleate nanocarrier for siRNA delivery’; Drummond et al. “Lamellar crystalline self-assembly behaviour and solid lipid nanoparticles of a palmityl prodrug analogue of Capecitabine-A chemotherapy agent”, *Colloids and Surfaces B*). Recent work is now focusing on functionalising the cubosome nanoparticles with their in-house antibodies for targeted therapies. CSIRO is looking for research projects to move this technology forward and commence further testing in *vitro/in vivo*.
   - Synthesis of nanoparticles for drug packaging. (2,4,8,9)
   - Cellular binding, uptake studies, drug release for targeted nanoparticles. (9,10) Dr Ben Muir is working with the Australian Animal Health Laboratories on investigating the interaction of various nanoparticle formulations with a number of cell lines including primary cells in *vitro* using techniques such as flow cytometry and confocal microscopy. The research aims to understand further how various nanoparticles interact with cells and enter cells, their fate after entering a cell and investigate the properties of cells that make them cytotoxic and how to mitigate these effects. The ultimate aim is to find methods to increase the half life in blood *in vivo* after bolus delivery of such nanoparticle systems.

2) **Research and development of bionano platforms:**
   - Microfluidics (1,2, 4)
   - CSIRO is investigating enzyme assisted self-assembly of peptide fibrils using thermolysin. There are opportunities to perform this work in microfluidic systems to allow for combinatorial discovery of optimum self-assembly conditions and peptide fragment to produce improved peptide gels and polypeptide structures.
   - Bio-analytics; molecular diagnostics (6,11,3, 10)
   - Prof Tanya Munro mentioned one optical fibre that has been developed can be used to monitor the release of hydrogen peroxide from stressed cell lines. This type of sensing method would be extremely interesting to investigate further, in particular when looking at the effects of various nanoparticle formulations on cell behaviour. Traditional cell metabolic assay methods include the MTT and Alamar blue assay. Developing new and improved methods to monitor cell behaviour would be extremely valuable.
   - Nanobiophotonics and nanobionics (13, 6, 1, 12)

3) **Focussed disease research:**
   - Stem cells and regenerative medicine. (1,2,4,5,9)
   - Identification of a disease target of importance in China and Australia. (all participants)
**8th China Australia Symposium Report**

**Report from Dr Chengzhong Yu**

Australian Institute for Bioengineering and Nanotechnology (AIBN), The University of Queensland, QLD 4072, Australia.
Email: c.yu@uq.edu.au

**Conference attended:** 8th China Australia Symposium on Science and Technology, Green Materials and Recycling Economy, 5-9 November 2011, Shanghai, Suzhou, People's Republic of China.

**Current research linkages with China**

I worked in Fudan University, Shanghai, China before I joined The University of Queensland in 2010, therefore, I have very broad connections and collaborations with China. Some of the active collaborators are listed below.

1) Prof. Dongyuan Zhao, Fudan University. We have > 50 co-authored publications.
2) Prof. Baohong Liu, Fudan University. We have ~ 10 co-publications.
3) Prof. Xinguo Jiang, Fudan University. We have an ARC DP commencing on 2011.
4) Prof. Yunhua Wang, Fudan University. We have ~ 5 co-supervised RHD students and ~ 10 co-authored publications.
5) Prof. Jianlin Shi, Institute of Ceramics, CAS. He has a student in UQ right now and I am his co-supervisor.
   Prof. Shi also attended this conference, Workshop 1.
6) A/Prof. Shaodian Shen, Shanghai Institute of Technology, Shanghai.
7) Prof. Jianshan Ye, South China University of Technology, Guangzhou. We have ~ co-publications.
8) Prof. Jiansheng Li, Nanjing University of Science and Technology.

**The session I presented in**

I attended Workshop 1: Biomedical materials and devices organized by Prof. Peter Gray and Prof. Xingyu Jiang. The title of my presentation is "Functional Nanoporous Materials in Biomedical Applications". We had 13 presentations all together covering diverse research fields, followed by a group discussion on future collaborations on 7th/November.

**Opportunities for future cooperation and possible follow-up**

From the group discussion, a lot of future collaboration opportunities have emerged. A big theme that has been discussed is drug delivery. For this topic, it is essential to understand the cell biology mechanism, signaling pathway, and interactions between carriers/drugs with cells, then use the right carriers to deliver drugs to the target. Thus, collaboration among Prof. Xiaogang Qu, Dr Angus Johnston, Prof. Lingwen Zeng, Prof. Jianlin Shi, myself, and Professor Martina Stenzel will form a strong team. However, in my understanding, we were not able to find out a common target that attracts all partners, i.e. we have all the tools to solve the problem, but the problem is not clear there.

Another big theme is the bio-analysis and detection, in which Professor Shanhong Xia, myself, Professor Tanya Monro, Prof. Xingyu Jiang have expertise. Prof Monro mentioned a potential collaboration with Prof. Jianlin Shi using silica hollow spheres in their silica glass for fiber sensor applications.

**Possible hosting of a return visit of Chinese participants and/or their research institutes/universities**

I will invite Prof. Jianlin Shi to visit AIBN/UQ next year around July to further our existing collaboration.

**Australia China Science and Research Fund**

During the last couple of days, we are organizing a team in Australia, preferentially including UQ, UWA, Monash, Griffith, and CSIRO. Our partner team in China may include Prof. Dongyuan Zhao in Fudan University, Prof. Huimin Chen from CAS, Prof. Zhongfan Liu from Beijing University as the key CIs. The proposed Joint Research Center will focus on Next Generation Functional Carbon Materials for Energy Applications. Details will be provided to you at a later stage.
Summary report on China – Australia Symposium, 6-8 November 2011, from Professor Veena Sahajwalla, University of New South Wales

Workshop 2 outcomes

The session presented in: Workshop 2: Recycling hard and liquid waste, 7 November, Suzhou.

Opportunities for future cooperation and possible follow-up:
Names of Collaborators:
1. Professor Fushen Zhang, Research Centre for Eco-Environmental Sciences, Chinese Academy of Sciences.
2. Professor Veena Sahajwalla, Director of the Centre for Sustainable Materials Research & Technology at the University of New South Wales.

Possible hosting of a return visit of Chinese participants and/or their research institutes/universities:
Professor Zhang to visit UNSW, Sydney from 12-16 December, 2011

Purpose of the visit:
Professor Sahajwalla and her Team at SMaRT Centre will host various meetings and discussions with Professor Zhang to develop and build collaborative relationship and capacity building in the area of e-waste.

Opportunities for future cooperation and possible follow-up:
Professor Zhang has invited Professor Sahajwalla to visit Beijing in the new year, 2012.
Professor Zhang has offered to pay for the travel expenses for both visits.

THE 8TH CHINA AUSTRALIA SYMPOSIUM ON SCIENCE AND TECHNOLOGY
REPORT FROM HABIB ZUGHBI, SENIOR RESEARCH ENGINEER, BLUESCOPE STEEL (BSL)

This year’s Symposium focussed on “Green Materials and Recycling Economy”. It included three workshops, namely (1) Biomedical materials and devices - the development and handling of biomaterials and devices”, (2) Recycling hard and liquid wastes from industry, including mining and (3) Materials for clean energy - new materials in battery, solar and other clean energy technologies.

I attended Workshop 2 and presented a paper related to the proposed treatment of steelmaking high-Zn waste streams and how such treatment fits in a process integration framework.

1. Current research linkages with china
BSL linkages with Chinese steelmakers and other researchers are developing - not many relationships were well established prior to the Symposium. The Symposium has certainly contributed towards establishing contacts with a number of CAS and Baosteel researchers. These contacts are expected to continue in the future.

2. Workshop 2: recycling hard and liquid waste
Information about the workshop, conveners, participants and the presentations is contained in the Symposium booklet.

Many of the presentations focussed on remediation, utilisation and management of solid and liquid domestic and industrial wastes. Presentations of interest to BSL included discussion of CO₂ capture using ionic liquids and carbonation (Dr Zhao). Furthermore, the work presented by Chinese researchers on ionic and supercritical liquids could be of interest, in the medium-to long-term, to BSL. There were 3 industry representatives from Australia but none from China. This point was raised and may be addressed in coming workshops. Some discussions with Chinese researchers have already taken place and will continue in the future.
This workshop provided a good opportunity to meet many CAS scientists and researchers, some of whom are interested in the work we are doing and vice versa. Some of the topics that were presented by Chinese researchers are of potential interest to steelmakers.

3. Industrial Visits
The Australian participants visited Suzhou Institute of Nano-Tech and Nano-Bionics (SINANO) and Suzhou Institute of Biomedical Engineering and Technology (SIBET); both Institutes belong to CAS. The participants also visited Shanghai Advanced Research Institute (SARI) and Shanghai Institute of Ceramics (SICCAS). These visits certainly highlighted the wide range of interests and the very fast speed at which Chinese research is developing.

4. Opportunities for future cooperation and possible follow-up
There is potential for future collaboration with Chinese researchers/institutions, however, for BSL this potential may be greater with research institutes of steelmaking companies. One scientist I met during the workshop and her colleagues (Professors Xiangping Zhang, Guoying Zhao and Liling Wang of the Institute of Process Engineering (IPE), CAS) have already offered to host me for a week at their Beijing labs to discuss topics of mutual interest, e.g. carbon capture and storage, however, due to my own time restrictions this invitation has been put on hold for the time being.

5. Possible hosting of a return visit of Chinese Participants and/or their research institutes/universities
In principle, BSL is happy to arrange a return visit of Chinese participant(s) who are interested in topics relevant to iron and steelmaking. BSL frequently hosts such meeting with researchers from universities, research institutes and other steelmakers.

6. Symposium facilitated other contacts
The visit to China offered me a good opportunity to engage in a two-day technical exchange meeting with researchers from Baosteel on November 9-10. This was a platform to discuss many topics of common interest between the two steelmakers and establish contacts with Baosteel researchers. It was the second such meeting between the two companies and certainly it paved the way for possible further meetings in the future. Technical exchanges are continuing as a follow up to the meeting.

It should be mentioned that Baosteel has established a collaborative research centre located at the University of Queensland (St Lucia Campus) in partnership with UNSW, UQ, Monash and UOW.

7. Conclusions
Participation in the Eighth China-Australia Symposium on Science and Technology has been very useful in establishing contacts with researchers from CAS and Baosteel. Researchers from CAS have already indicated a willingness to collaborate, however topics that are likely to bring value to BSL business are still under consideration.

Baosteel researchers also showed a willingness to collaborate. Communication and exchange of information with Baosteel lead researchers on recycling of waste streams, environment, energy, process integration/LCA, BF, PCI, Cu staves and sintering are continuing.
Workshop on “Recycling solid and liquid waste”

An overview

R Naidu, CRC CARE and University of South Australia

Background

Workshop on “Recycling of solid and liquid wastes recognizes the massive volume of such wastes generated in the urban environment and the lack of appropriate policies and strategies to manage this serious and burgeoning problem. The workshop heard that the total volume of municipal waste annually exceeds 2 billion tons and is more than doubled by the inclusion of industrial liquid and solid wastes. While developed countries invest significant resources in managing these wastes, the most common method of waste disposal in developing countries is to dump wastes onto land and water bodies. In the early 1990s it is estimated that the Asian countries alone spent about US$25 billion per annum on solid waste management, a figure expected to rise to around US$50 billion by 2025. This suggests that solid waste management (SWM) has become a large, complex and costly industry in its own right. Solid Waste Management is the discipline associated with the control of generation, storage, collection, transfer, processing and disposal of municipal solid waste. At the same time both cities and industries generate liquid wastes. While some countries have developed complex technologies to remediate municipal effluents, many developing countries are facing rising community anger over the potential risks arising from unknown bio and chemi hazards. This indicates that successful waste management strategies also need to incorporate significant public consultation.

Papers presented at the workshop addressed the following key themes:

(a) E-wastes- potential impact of e-wastes to environment and human health;
(b) Liquid waste and micro fuel cells (MFC)
(c) Urban wastes- a source of nutrients
(d) Tyres- source of energy- steel production
(e) Remediation including soil, ground water and liquid wastes
(f) Ionic liquids
(g) Solid waste recycling- including plastics and papers

While majority of the papers focused on applied science there were some papers that included fundamental science (example Ionic liquids).

Key outcomes

(a) The need for sustainable management of solid and liquid wastes;
Minimize landfills

Wastes can be primary resource for a number of activities including:
  a. Energy
  b. Nutrients

Irrespective of the country (developed or developing) there is some degree of recycling although its sustainability and implications to greenhouse gas emissions is rarely considered;

Sustainable strategies need to include society, environment and cost effectiveness.

Towards the end of the workshop discussions focused on an appropriate business model for collaborative research involving China and Australia that could result in the development of and implementation of sustainable technologies for the recycling/reuse of solid and liquid wastes. The conveners focused on particular themes and key individuals who could lead such projects for example:

a. Urban waste recycling- plastics, etc: Dr Yongguan Zhu and Mr David Singh
b. E-Wastes: Prof Veena Sahajwalla and Prof Fushen Zhang

While Professor Naidu and his CRC have long worked on both areas, the involvement of CRC as part of the collaborative team did not come through during the discussions.

Current CRC CARE collaborations in China

a. E-wastes- Hong Kong Baptist University and a number of Universities in China;
b. Solid and liquid wastes- piggery wastes- collaborations with HUST
c. Red Mud remediation- collaboration with HUST
d. Solid wastes to energy- collaboration with HUST
e. Biomass to energy- collaboration with Hong Kong and HUST

Opportunities for future cooperation and possible follow-up

Following the Shanghai workshop I have had significant discussions with Associate Prof. Guoying Zhao, Institute of process engineering, Chinese Academy of Sciences for possible collaboration on Ionic Liquids. We are looking towards establishing joint research provided we are able to generate external funds.

Following my London visit in November, the team from China, Taiwan, Japan, Thailand and Hong Kong will be working on e-waste recycling in the region with the initial focus being policies for managing such wastes. CRC CARE has been invited to lead the development of a standard on e-wastes.

Society- community interactions from waste perspectives

Possible hosting of a return visit of Chinese participants and/or their research
institutes/universities.

We look forward to hosting visits from Chinese Participants and/or their research institutes. Should my request for such a visit be successful for funds I will ensure that all waste recycling session participants from Australia are invited to join me in hosting the visit.
8th China Australia Symposium, 5-8 November 2011

Brief Report from Professor Yi-Bing Cheng, FTSE
Monash University

I currently have a fractional appointment as one of the One Thousand Talent Professors at the Wuhan National Laboratory for Optoelectronics, Huazhong University of Science and Technology, Wuhan, China, where I have established a solar cell research lab with three academic staff and about 20 research students. This position has allowed me to facilitate collaborations between Chinese researchers and those in the Victorian Organic Solar Cell Consortium on photovoltaic.

The meeting in Suzhou was a very useful opportunity, through which I got to know researchers at the Suzhou Institute of Nanotechnology, CAS. My presentation attracted some interests from Chinese researchers. Complementary research interests on organic solar cells were identified, which could lead to actual collaboration work. Chinese researchers will be very welcome to visit the solar lab at Monash University.

REPORT ON 8TH CHINA AUSTRALIA SYMPOSIUM (MATERIALS FOR CLEAN ENERGY WORKSHOP): Shanghai and Suzhou, People’s Republic of China from 5-9 November 2011.
Professor Paul Meredith, University of Queensland, Centre for Organic Photonics & Electronics

Background and Objectives: I participated in the Materials for Clean Energy Workshop and presented a seminar entitled “Organic Solar Cells: Beyond the Shockley-Queisser Limit”. My objectives in attending the workshop were to: i) establish the level and sophistication of activity in my field in China; ii) forge new linkages with the top Chinese groups in preparation for a potential collaborative partnership under the ACSRF Joint Research Centres initiative.

Current Research Linkages with China: Our Centre’s engagement with Chinese groups has to date been very limited indeed — our focus being Europe, the United States and India. We are aware of the opportunities presented by the bilateral Australia-China arrangements and as such are investigating new partnerships with a number of institutions including Huazhong University of Science and Technology, Shenzhen Institute of Advanced Technology (CIS), Chinese Academy of Sciences Beijing and Suzhou Institute of Nano-tech and Nano-bionics (CIS).

Opportunities for Future Collaboration & Follow-up: I presented in the Materials for Clean Energy Workshop. Arising from that workshop, together with colleagues at Monash University, Melbourne and CSIRO, we have been developing a strategy for an ACSRF Joint Research Centre with CIS Beijing, Suzhou Institute and Wuhan. This is to be focused on the research opportunities in next generation photovoltaics (particularly organic PV and dye sensitized solar cells). Expressions of interest have been filed with all four Australian organizations but unfortunately both UQ and Monash failed to short-list. Melbourne University and CSIRO are yet to decide on the EoI outcomes. Unfortunately only 1 proposal can be submitted by each institution and we are not optimistic of a positive outcome given the degree of competition.

Host Return Visits: We would be delighted to host a return visit by any members of the participating Chinese institutions. In November, we hosted a senior delegation from Huazhong University of Science and Technology investigating new relationships in Australia.
Report from Professor Hua Kun Liu, University of Wollongong

I was very impressed by the rapid developments in Shanghai and Suzhou. Many young Chinese scholars return to China: there is a tide of returning of young Chinese scholars to China as many universities and institutions have created specially appointed Professorial positions with very attractive salaries and large research funding support. There are different forms of returning scholars. Some return to take permanent academic or technical positions in institutions or companies. Some act as representatives of their companies to perform research or conduct business in China. Some are regular visiting academics to work at institutions for a period of time. Many become entrepreneurs.

**Current research linkages with China**
- Institute of Physics, Beijing (Prof. Zhaoxiang Wang and Liquan Chen)
- Shanghai University (Prof. Ying Li)
- Hubei University (Prof. Chungqi Feng)
- Fudan University (Prof. Xuebin Yu and Yuping Wu)
- Nankai University (Prof. Jun Chen)
- East China University of Science and Technology

**The session you presented in opportunities for future cooperation and possible follow-up**
With Institute of Chemistry (Prof. Yu-Guo Guo) & Soochow University (Prof. Honghe Zheng), we three have exchanged the information and expressed to have mutual visits later on.

**Possible hosting of a return visit of Chinese participants and/or their research institutes/universities.**
Our institute (ISEM, UOW) receives the visitors from China very often, for example, after the meeting in Shanghai and Suzhou ISEM has the following visits:

Chinese delegation (10) from Patrol Institute of Qingdao visited 23 Nov 2011.
Dr. Fei Yang from Changzhou New Energy Vehicles Research Academy visited 8th Dec 2011.
Prof. Weijia Wang from Hong Kong Science and Technology University visited 9th Dec 2011.
Prof. Zhaoxiang Wang from Institute of Physics, Beijing will visit UOW in Feb 2012
A/Prof Chongjun Zhao from East China University of Science and Technology will be a visiting Prof at UOW for one year.

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1. **your current research linkages with China**
I have quite strong research linkage with Chinese Academy of Sciences, particularly two research institutes (Institute of Metal Research, Shenyang, and Dalian Institute of Chemical Physics)

2. **the session you presented in opportunities for future cooperation and possible follow-up**
Wworkshop 3 provided an excellent platform for the researchers in clean energy areas to collaborate in the near future. Will follow up with Suzhou Institute of Nano-tech and Nano-bionics on rechargeable batteries study, and with Shanghai Institute of Ceramics on solar energy driven materials for solar cell study.

3. **possible hosting of a return visit of Chinese participants and/or their research institutes/universities.**
Professor Jianlin Shi of Shanghai Institute of Ceramics, CAS will visit my group in June/July 2012 for further collaborations.
The symposium was hosted by: Australian Academy Science (AAS), Australian Academy of Tech, Sciences and Engineering (ATSE) and Chinese Academy of Sciences (CAS)
- The split in areas allowed for focused workshops in each area, followed by reporting from each workshop to the whole symposium. This approach allowed a wide and disparate range of technologies to be covered in a detailed way.

Workshop 3: Materials for clean energy, Suzhou, 6 November 2011
Paul MEREDITH – University of Queensland – Organic Photovoltaics
- Investigation of the compound YF2S as a non-fullerene acceptor with a PCDTBT donor. Absorption is seen in both donor and acceptor increasing the absorbance bandwidth.
Ning DAI – Shanghai Institute of Technology – Cadmium Selenide and Silicon QDs
- Structures for and measurement of Multiple Exciton Generation in quantum dots of these materials. The role of surface passivation in enhancing MEG.
Gavin CONIBEER – UNSW - Advanced Photovoltaic Approaches
- Approaches towards Lower Cost Per Watt solar cells using Third Generation approaches such as Thin Film Tandems, up/Down conversion and Hot Carrier cells.
Yi-Bing CHENG – Monash University – Dye Sensitised solar cells (DSSC)
- Reporting on the Victorian Organic Photovoltaic consortium
Jian-Rong DONG - SINANO – III-V multi-junction solar cells
- Use of beam splitting to combine the outputs from III-V dual junction tandem cells for different parts of the spectrum, to achieve a combined efficiency of 43.1%.
Lianzhong WANG – UQ – Photo-electrolysis (PE)
- Use of transition metal oxides as electrodes for PE cells to directly split water into hydrogen and oxygen.
Xudong XIAO – Shenzhen – CulnGaSe2 module production line
- Reporting on the establishment of a production line for CIGS modules with 12% module efficiency achieved.
Hua Kun LIU – Wollongong University – Li batteries
- Use of LiMO2, NiO and SnO2 as battery materials with nanoparticles used to control damage caused by expansion/contraction cycling.
Honghe ZHENG – Electric vehicles in China and US
- A comparison of the targets, regulations and technology for electric vehicles in both countries.
Yuguow GUO – Chinese Academy of Sciences – Li ion batteries
- Use of Carbon nanotubes and TiO2 for battery technologies. The use of different micro- and nano-scales to control the problems of carrier transport and thermal expansion/contraction on cycling, respectively.

Visits around Shanghai – Suzhou 7-8 November 2011
Suzhou Institute Nanotech and Nano-bionics (SINANO), Zhangjiang High-tech Park - university, research park & tech transfer all on one campus and Shanghai Synchrotron – 3rd Gen machine, twice size of Australian synchrotron - currently 7 beam lines – can have up to 21 beam lines - overseas researchers can submit proposals but greater success with Chinese collaboration.

Collaborations: Several potential collaborations were discussed during symposium and associated visits. These included:
Topics on Third Generation PV:
- Growth of II-VI nitrides for Hot Carrier cells - Profs Zheng and Dong, SILANO
- Combination of CZTS/CIS with up-conversion to improve current – Prof Dai, CAS and Prof Xiao, Shenzhen Inst. and Chinese University of HK
- Materials for PE cells with the UNSW work on PE devices – Prof Wang UQ
- Colloidal dispersion of Ag2S QDs for QD cells – Prof Qinbin Wang, SINANO

Organic solar cells:
Potential to join the China-Australia collaboration with the work at UNSW on hybrid OPV led by Prof Uddin.

Summary: The symposium and associated events was a very useful forum to foster collaboration. Several existing collaborations with China were extended and new ones discussed and furthered. The visits were an important part of the program showing the great availability of high class institutes around the Shanghai/Suzhou area. It would be most valuable to host some of the Chinese researchers during a return visit in Australia.
### ISE REPORT ON CHINA AUSTRALIA SYMPOSIUM - STATEMENT OF INCOME AND EXPENDITURE AS AT 30 JULY 2012

<table>
<thead>
<tr>
<th>Name of organisation</th>
<th>Australian Academy of Technological Sciences and Engineering</th>
</tr>
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<tr>
<td>Contact name:</td>
<td>Dr Margaret Hartley</td>
</tr>
<tr>
<td>Position:</td>
<td>CEO</td>
</tr>
<tr>
<td>Contact number:</td>
<td>03 9864 0900</td>
</tr>
<tr>
<td>Email address:</td>
<td><a href="mailto:margaret.hartley@atse.org.au">margaret.hartley@atse.org.au</a></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>ISE China Australia Symposium Activity</th>
<th>Expenditure $</th>
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</thead>
<tbody>
<tr>
<td>Return airfares to China and associated expenses for up to 22 Australian representatives plus 2 return business class airfares to China and associated expenses for Presidents of ATSE and AAS, ground transportation for the Australian delegation to and from the airport in Australia and a gift for the head of the Chinese Delegation. Includes project administration and management costs for the 20111 China Australia Symposium of $10,050.00</td>
<td>$61,050.00</td>
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<tr>
<td>Written approval received from DIISRTE on 6 July 2012 for underspend of $16,000 to be transferred to AIRE</td>
<td>$16,000</td>
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<td>Approved funding for activity</td>
<td>$77,050</td>
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**Signature:**

**Name:** DR MARGARET HARTLEY

**Position:** Chief Executive Officer

**Date:** 30 July 2012