

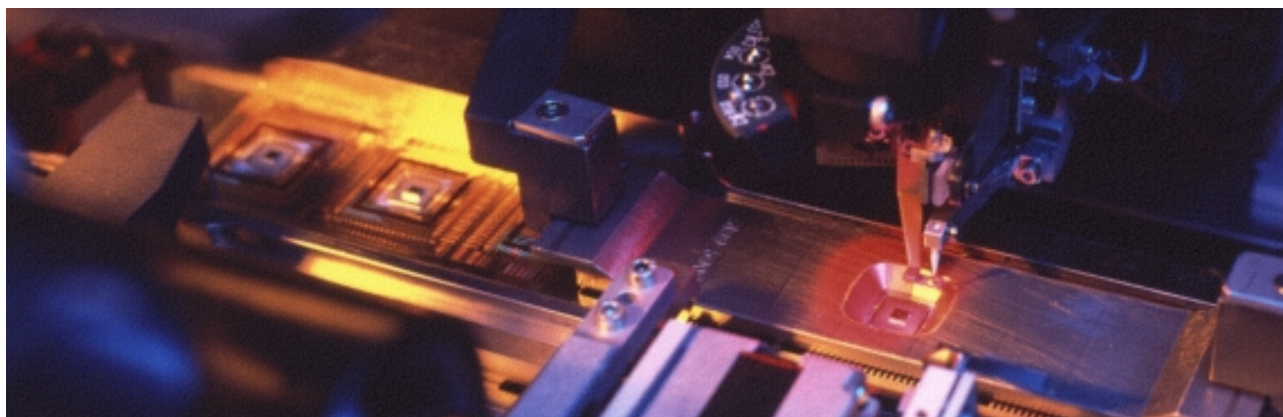
# PERSPECTIVES

Research, Development and Commercialisation

Institute of Materials Research & Engineering (IMRE)

IMRE is a research institute supported by the Agency for Science, Technology and Research and is an affiliate of the National University of Singapore.

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## Scientific Advisory Board



Some of the SAB members being briefed on IMRE's OLED research; (L-R) Prof Edward Kramer, Dr Masami Tatsumi, Prof Julius Vancso, Prof Otto Lin, Prof Wolfgang Knoll and Prof Buddy Ratner. Dr Zhu Furong (third from right) from IMRE's Opto- and Electronic Systems Cluster is giving the OLED briefing to the SAB

The inaugural meeting of IMRE's newly appointed Scientific Advisory Board (SAB) was held from 3<sup>rd</sup> to 5<sup>th</sup> September.

The role of the SAB is to review the existing research activities and to guide future development of the Institute's capabilities and expertise. The Board also advises on the global and strategic directions for IMRE.

The SAB comprises 9 members, all of whom are internationally renowned scientists in their respective fields of materials research. Holding prominent appointments in academia and industry, the SAB's combined experience, knowledge and expertise is a valuable asset to the Institute. Their vast research experience can assist IMRE in identifying new strategic R&D areas and new initiatives for manpower development and exchange programmes.



Institute of  
Materials Research  
and Engineering

## Editorial

Dear Readers,

IMRE's newly commissioned Scientific Advisory Board (SAB) recently convened its inaugural meeting, the first of many to come. Made up from esteemed members from the scientific community, the SAB can help the Institute develop and streamline its existing research portfolio and nurture new research initiatives.

More importantly though, the meeting also presented a unique opportunity for IMRE's research staff to get acquainted and to share their views with the SAB members. Judging by the lively and immersive sessions, it was clear that the symbiotic relationship was off to a flying start.

Future topical meetings have already been outlined with strategic planning and review proceeding to the cluster level. This provides for even closer interaction and a better understanding between the SAB members and the research staff.

The closeness of this new partnership will prove essential in helping plan IMRE's success, one that will be achieved together.

The Editor



IMRE's researchers were also involved in discussions and feedback sessions with the SAB



IMRE's SAB and researchers who participated in the meetings

The meeting was held over a three-day period, and included the active and engaging participation of management and senior research staff from IMRE.

Building a balanced research portfolio that will help IMRE achieve its missions of materials knowledge creation, human capital development, and technology transformation through innovation was one of the topics discussed.

Technology planning towards long-term opportunities and goals in research was also analysed to ensure that the Institute's research could provide significant impact in research and industry applications. The meeting discussed about benchmarking the Institute's research capabilities and achievements on an international scale as well. This measure of performance, past and present, could be used as a possible gauge in helping IMRE's ambition towards becoming a world-class research organisation.

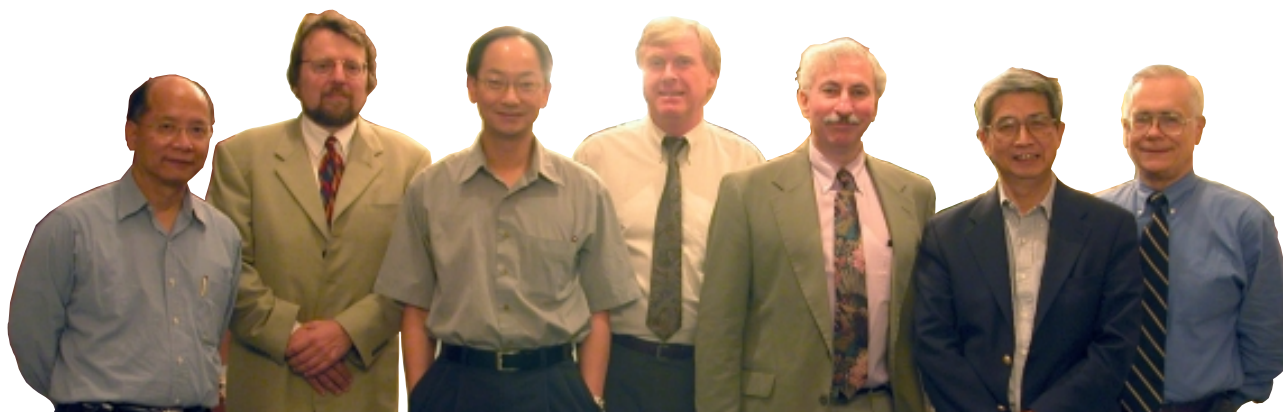
Other topics on the agenda included looking at "recipes" for achieving IMRE's success, and the strategies for future technology directions. These are long-term objectives that can create impact, through quality research work, and is in alignment with IMRE's mission and vision. Greater, and more in depth future discussions on these topics will involve the SAB, research staff and IMRE's stakeholders.

"The SAB has a significant contribution to IMRE because, as experts in materials science and engineering, they provide critical technical inputs to our research agenda, and help us set strategic directions," said Prof Albert Yee, Director of IMRE.

"As scientists with a broad international overview, they can help us benchmark and introduce best practices in IMRE. They have a different perspective that we can use," Prof Yee added.

Plans are already underway for annual meetings and regular sub-group meetings to review the progress of IMRE's on-going scientific research.

Apart from planning for the future, sub-group meetings in particular, will involve topical sessions with the clusters. These sessions will focus on reviewing research projects and scientific content in greater detail. 🌐



Prof Albert Yee (left), Director of IMRE with some of the SAB members who attended the meeting; (second from left - right) Prof G. Julius Vancso, Prof William Tang, Prof Wolfgang Knoll, Prof Buddy Ratner, Prof Otto C. C. Lin, Prof Edward Kramer

# PROFILE -- IMRE'S SCIENTIFIC ADVISORY BOARD

**Professor Wolfgang KNOLL**  
(Chairman, IMRE Scientific Advisory Board)  
Director  
Max-Planck-Institut für Polymerforschung in Mainz

**Professor Paul A. ALIVISATOS**  
Professor, Department of Chemistry  
University of California, Berkeley

**Professor Edward KRAMER**  
Professor, Departments of Materials and  
Chemical Engineering  
University of California, Santa Barbara

**Professor Otto C. C. LIN**  
Vice-President for Research and Development  
Professor of Industrial Engineering and  
Engineering Management  
Hong Kong University for Science and  
Technology

**Professor Buddy RATNER**  
Director  
University of Washington Engineered  
Biomaterials (UWEB)  
Professor, Department of Bioengineering



Other members  
of the SAB  
include (from  
left - right) Prof  
Paul A.  
Alivisatos, Dr  
Masami Tatsumi  
and Prof Jackie  
Y Ying

**Professor William TANG**  
Professor, Department of Biomedical Engineering  
Henry Samueli School of Engineering  
University of California, Irvine

**Dr. Masami TATSUMI**  
General Manager  
Itami R&D Laboratories  
Sumitomo Electric Industries Ltd

**Professor G. Julius VANCOSO**  
Head of Polymer Materials Science and  
Technology Department  
University of Twente

**Professor Jackie Y. YING**  
Raymond A., & Helen E. St. Laurent Associate  
Professor of Chemical Engineering,  
Massachusetts Institute of Technology



# New Deputy Director (Industry) for IMRE



**Prof Chua Soo Jin, Deputy Director (Industry), IMRE**

Professor Chua Soo Jin was appointed IMRE's Deputy Director (Industry) with effect from 1 September 2002.

Prof Chua is no stranger to industry. Having spent more than 20 years in research, Prof Chua's interaction with industry has been fairly extensive, both through

working on collaborative projects and by providing consultancy to companies here in Singapore and in the region. He is well recognised in the field of optoelectronics and has been engaged by companies to provide specialised optoelectronics courses.

Prof Chua has been the Director of IMRE's Opto and Electronics Systems Cluster since January 1997. He is also currently the Deputy Director of the Singapore-MIT Alliance. Prof Chua had previously served as the Assistant Director of the Institute of Microelectronics. The experience that he brings with him, past and present, is certain to impart added value to his new appointment as IMRE's Deputy Director (Industry).

## What will be your role as the new Deputy Director (Industry)?

IMRE's vision is to be a leading research institute for materials science and engineering dedicated to the advancement of Singapore. The immediate and most obvious impact we can make in this respect is to assist industry in value and knowledge creation in order to be competitive in the knowledge-based economy. IMRE is an institute focused on developing biomaterials, polymers and optoelectronic materials, which are at the top of the value chain in supporting a wide range of products. One of my roles will be to foster interaction between our researchers and their industry counterparts. Such interactions serve three purposes. Firstly, it enables industry to have access to IMRE's expertise and know-how, which can be applied in the development of new products and processes. Secondly, it creates awareness in our researchers about the types of issues and problems faced by industry. Finally, such interactions help develop the mindset of the IMRE researcher into thinking about applications for the scientific discoveries that they make. In other words,

researchers should think beyond scientific curiosity and look at ways their discovery can benefit industry and Singapore.

## What is IMRE's current status in regards to industry-related activities?

We have been collaborating with industry partners since our inception and are currently working on several industry projects with multinational corporations (MNCs). Materials issues are more fundamental in nature, tend to introduce quantum leaps in product evolution, and require more knowledge intensive development. MNCs have the capacity to undertake longer-term projects aimed at specific windows of opportunities. They are better able to balance risks with impact. MNCs also have other activities that are able to bridge the gap in the value chain, from design to manufacturing, and are able to translate the new materials developed into new products. However, there are increasing opportunities for IMRE to help the small and medium enterprises (SMEs) improve their materials content and optimise materials to meet local conditions. IMRE hopes to take a more proactive stand in engaging industry.

## What are some of the future plans in store for IMRE with respect to industry?

We intend to create a greater awareness of new developments in materials through more IMRE-hosted Industry Symposiums and open seminars on our website. The recent symposium had some 30 companies approaching IMRE for follow-up discussions for possible projects ranging from biomaterials to nano-technology. We will be sending technical teams to visit these companies to work out suitable project proposals. Together they will help to identify and evaluate research topics that can and needs to be done, and the associated technology threats faced.

IMRE will continue to organise activities that could foster greater dialogue with industry. If similar research interests are identified, IMRE may even hold seminars on-site at the respective companies so as to actively involve more of their engineers and researchers.

We will also work more closely with agencies like EDB to showcase our research capabilities in the hope of attracting new investments into Singapore. In partnership with other research institutes, we hope to identify technology gaps and develop capability to support emerging industries in Singapore. 

# INDUSTRY SYMPOSIUM

## 30 AUGUST 2002



Members of local industry and IMRE staff attending IMRE's first Industry Symposium

IMRE organised a symposium for members of local industry on the 30th of August to promote the Institute's R&D activities to Singapore companies. The event was also to foster greater interaction between IMRE's researchers and industries, thus allowing potential areas for collaboration to be identified.

About 75 participants, mainly from small and medium enterprises (SMEs) and multinational corporations (MNCs), attended the event. This event included presentations on some of IMRE's main areas of core competence, poster presentations on current research, and



On display - Posters highlighting IMRE's many research capabilities


guided tours of the various research laboratories.

Specifically aimed at industry, the event is the first in a series of industry outreach programmes. The Institute intends to actively interact with local companies and look into areas that have the potential for mutual cooperation and collaboration. IMRE's know-how and expertise in materials research can then be used to aid these companies in knowledge creation, and improving processes and products.

"The objective of this symposium is to showcase IMRE's research achievements and capabilities, and initiate dialogues between our researchers and the industry engineers and entrepreneurs," said Prof Chua Soo Jin, IMRE's newly appointed Deputy Director (Industry).

"IMRE has the know-how in terms of intellectual properties and expertise in materials, which can be utilised by industry."

Prof Chua added that this symposium has provided IMRE with prospective companies that are able to interact and work collaboratively with the Institute.

Feedback garnered from the symposium participants was also very encouraging. Most of the attendees expressed interest in exploring collaboration opportunities with IMRE. They also hoped to see more of such symposiums, targeted at specific areas of research like biomaterials, characterisation, optoelectronics and nanoscience. 



Some of the symposium participants being briefed on IMRE's biosensor research

## First Chemistry-IMRE Joint Symposium




Prof Albert Yee delivering his opening address at the start of the combined symposium

The First Chemistry-IMRE Joint Symposium, held on the 10<sup>th</sup> of September 2002, was the result of a combined effort between IMRE and NUS' Department of Chemistry.

The aim of the symposium was to promote the R&D activities of the respective organisations, to facilitate interaction between the research staff from both sides, and to look into collaboration opportunities. About 130 staff and students from IMRE and NUS, in related fields of

study, attended the symposium.

The 12 speakers gave presentations on a wide array of topics including materials characterisation, biomaterials, and chemistry. One of the keynote lectures – "Evanescent wave optics for the characterisation of polymer thin films" – was presented by Professor Wolfgang Knoll, a Temasek Professor with NUS' Department of Materials Science.

Held in conjunction with the symposium, a poster session also allowed other research activities from the two organisations to be showcased, providing more opportunities for interaction. 



Participants at the symposium



**Dr Gregory Goh with daughter, Mathea**

## HOMESPUN MATERIALS RESEARCH TALENT

Research scientists are a rare breed in business and tech-savvy Singapore. Impressions about scientific research still border on long hours in the laboratory, and repetitive, boring tasks. That may have been the case then but the local research scene now is undergoing changes, with the 'dull' label giving way to a younger, more vibrant look and feel.

Researchers like Dr Gregory Goh are the new faces of the Singapore scientist. A Research Fellow in IMRE's Opto- and Electronics System Cluster (OESC), Dr Goh is one of the many homespun talents who are increasingly seeking careers in science. Outside of research work, Dr Goh likes exploring new places and cities, and spends most of his spare time with his family. Having been married for seven years now, he is also a doting father to his bubbly 2-year old.

### What research are you currently doing in IMRE?

My current research concerns film and nanostructure growth in aqueous solutions at low temperatures (250°C and below), utilising the hydrothermal deposition method. As the hydrothermal method employs low temperatures, this leads to low capital and operating costs and the use of less temperature resistant substrates. In addition, the simplicity of the technique makes it suitable in automation and batch processing. It also overcomes the shortcomings of many other deposition techniques in that it is not a line-of-sight process and can deposit uniform films on non-planar surfaces. This basically means that I am working on a potentially better and cheaper way for layering or depositing thin films of materials onto a host of substrates.

### How did you first get involved in research? Was this your lifelong ambition?

My first experience with materials science was in a second year class at NUS' Mechanical Engineering

(ME) department. I liked it very much and in my fourth year, three out of the four classes I took were related to materials research! My final year project was also conducted with the ME department's Materials Science division. Back then NUS did not have a Materials Science department. From that point on, I seriously considered materials research as a career option and you could say I made it my ambition to pursue that option. Looking back, I guess I was always interested in science, wondering about how and why things worked the way they did. In that sense, you could say that I have always harboured ambitions to be a scientist.

### Were you a scholar back in school?

I was never on any scholarship before coming into IMRE. In fact I was a "late bloomer"; last in class in Primary 4 and third from last in Primary 5. Fortunately for me, they only started Primary 4 streaming the following year. All this changed when my grades suddenly shot up from Secondary 1 onwards. I don't know why since I was studying just as hard as when I was in primary school.


### How did you come to be associated with IMRE?

I did my final year project and my Masters in Engineering degree with the Materials Science division, then under the supervision of A/Prof L. C. Lim. A/Prof Lim worked closely with Prof Shih Choon Fong, the founding director of IMRE. A/Prof Lim was the one who recommended me for an IMRE scholarship.

### What happened next?

I went on to do a Doctorate degree with the Materials department at the University of California, Santa Barbara in the United States. I was there for a total of four and a half years. During this period I was on an IMRE scholarship that paid the course fees.

### Do you have any advice for aspiring young scientists?

Research is hard work but it's such that it keeps you constantly thinking. That's what makes it such a challenge. If you love doing what you do in research then it does not seem like a chore. 


## MAKING THE NEWS AGAIN – LAB-ON-A-BEAD

A research project that has the potential to produce the next generation of diagnostic kits was featured in the 30 July 2002 edition of the Straits Times' *Tech & Science* section.

In the May 2002 issue of the Perspectives, we highlighted the research of Dr Han Mingyong, a senior research fellow with IMRE. Dr Han's work illuminated the prospect of early detection of diseases like cancer through the combination of biotechnology and nanotechnology, a research area aptly named bio-nanotechnology.

Using light-emitting nano-sized crystals embedded on a tiny plastic bead, these little diagnostic kits – labs-on-a-bead - would be able to detect the types of proteins in a sample and give a quantitative figure to the amount present. The light-emitting nano-sized crystals are coated with specific molecules - for instance antibodies - and give off different coloured lights depending on the complementary antibodies that react with the bead.

Dr Han is a Senior Research Fellow with the Institute's Molecular and Bio- Materials Cluster.

More information on this, and other stories, can be found in past issues of IMRE's newsletters, PERSPECTIVES and IMPACT. To view a copy of these issues, please log on to our website at: <http://www.imre.a-star.edu.sg> 



*The article that appeared in 30 July 2002 edition of the Straits Times*

# Visitors and Events

## Research scholars of the National Science Scholarships (NSS) 24 & 26 June 2002

Scholars under the National Science Scholarship scheme visited IMRE as part of an induction programme organised by the Agency for Science, Technology and Research (A\*STAR). The visit was to familiarise the scholars with the research institutes (RIs) that had relevance to their fields of study.

## Students from Singapore-MIT Alliance (SMA) 28 June 2002

Students from SMA's Advanced Materials for Micro- and Nano- Systems (AMMNS) postgraduate degree course visited IMRE as part of the orientation programme for new students. The visitors were taken on a tour of the research laboratories including characterisation, organic light-emitting devices, biomaterials, controlled release devices and biosensors.

## Exploit Technologies Pte Ltd (ETPL) Roadshow 12 July 2002

ETPL, the commercialisation arm of A\*STAR, was on hand to update IMRE about ETPL's mode of operation, and the suite of services and support that they offer to the RIs. Senior researchers from IMRE attended the roadshow that included discussions on issue like intellectual property and patent mapping.

## IMRE Industry Symposium 30 August 2002

Organised by IMRE for members of the local industry, the industry symposium was a showcase of the research capabilities and expertise available at the Institute. It was also

an event designed to promote greater interaction between IMRE's scientists and the industry to allow possible areas of collaboration to be identified. For more details about the event, please refer to the complete article in this issue.

## IMRE Scientific Advisory Board (SAB) Meeting 3-5 September 2002

The first meeting for the SAB was to review current research activities and to guide IMRE's development of research capabilities and know-how. Held over a three-day period, the meeting involved the participation of management and senior research staff of IMRE. For more details about the event, please refer to the complete article in this issue.



NSS research scholars on a tour of one of biosensors lab



SMA students being briefed on the finer points of Atomic Force Microscopy (AFM)




ASID delegates being briefed on IMRE's characterisation facilities

## Delegates from the 7<sup>th</sup> Asian Symposium for Information Display (ASID 02) 5 September 2002

ASID 02 coordinators and IMRE's Opto- and Electronics Systems Cluster (OESC) organised a tour of the Institute for some of the conference's delegates. Of particular interest and relevance to the delegates was the research on organic light-emitting devices, optoelectronics and IMRE's high-tech characterisation facilities.

## First Chemistry-IMRE Joint Symposium 10 September 2002

Jointly organised by IMRE and NUS' Department of Chemistry, the symposium was open to staff and students from both organisations. Apart from being a platform for promoting the R&D activities of the organisers, the symposium also allowed the scientists from IMRE and NUS to look into possible areas of cooperation in research. For more details about the event, please refer to the complete article in this issue. 

# Publications

## Introduction

Listed here are the papers published by IMRE's researchers for the period between June 2002 and July 2002.

## Publications - JUNE 2002

- The hardness and Young's modulus evaluations of low k thin film and barrier layer**  
 Lu Shen, Kaiyang Zeng, Yihua Wang, Babu Narayanan, and Rakesh Kumar  
 The 8th IUMRS International Conference on Electronic Materials 2002  
 For further information, contact: [lu-shen@imre.a-star.edu.sg](mailto:lu-shen@imre.a-star.edu.sg)
- Nano-indentation studies of transparent conducting oxide thin films**  
 Kaiyang Zeng, Furong Zhu, Jianqiao Hu, Lu Shen, and Keran Zhang  
 The 8th IUMRS International Conference on Electronic Materials 2002  
 For further information, contact: [ky-zeng@imre.a-star.edu.sg](mailto:ky-zeng@imre.a-star.edu.sg)
- Photoluminescence and time-resolved photoluminescence studies of InGaN/GaN quantum wells**  
 X. H. Zhang, S. J. Chua, W. Liu, and P. Li  
 The 8th International Conference on Electronic Materials  
 For further information, contact: [xh-zhang@imre.a-star.edu.sg](mailto:xh-zhang@imre.a-star.edu.sg)

- Optical pumping and time-resolved photoluminescence studies of aryl-substituted PPV derivatives**

X. H. Zhang, Z. K. Chen, S. J. Chua, and K. S. Wong  
 The 8th International Conference on Electronic Materials  
 For further information, contact: [xh-zhang@imre.a-star.edu.sg](mailto:xh-zhang@imre.a-star.edu.sg)

- Improvement of hole-injection in phenyl-substituted electro luminescent devices by reduction of oxygen deficiency near the indium tin oxide surface**

B.L.Low, F.Zhu, K.Zhang, and S.J.Chua  
 Applied Physics Letters, 80(2002) 4659  
 For further information, contact: [lr-zhu@imre.a-star.edu.sg](mailto:lr-zhu@imre.a-star.edu.sg)

- Polyphosphoester microspheres for sustained release of biologically active nerve growth factor**

Xiaoyun Xu, Hanry Yu, Shujun Gao, Hai-Quan Mao, Kam W. Leong, Shu Wang  
 Biomaterials, 23, 3765-3772, 2002  
 For further information, contact: [nmiyuh@nus.edu.sg](mailto:nmiyuh@nus.edu.sg)

- Determination of betamethasone disodium phosphate in vitro media of PLGA microspheres**

Wang Ling, Yang Yi Yan, Chung Tai Shung, Chen Xue Qin  
 Journal of Pharmaceutical and Biomedical Analysis 28, 628-635, 2002  
 For further information, contact: [yy-yang@imre.a-star.edu.sg](mailto:yy-yang@imre.a-star.edu.sg)

- Cellulose acetate membranes for transdermal delivery of scopolamine**

Wang Fang Jing, Yan Yi Yan, Zhang Xian Zheng, Zhu Xiao, Chung Tai Shung, Mochhala Shabbir  
 Materials Science and Engineering. C20, 93-100, 2002  
 For further information, contact: [fj-wang@imre.a-star.edu.sg](mailto:fj-wang@imre.a-star.edu.sg)

- **Preparation & characterisation of platinum-based electrocatalysts on multiwalled carbon nanotubes for proton exchange membrane fuel cells**  
Liu Zhaolin, Lin Xuanhao, Lee Jim Yang, Zhang Weide, Han Ming, Gan Leong Ming  
*Langmuir*, 2002, 18, 4054-4060  
For further information, contact: [zl-liu@imre.a-star.edu.sg](mailto:zl-liu@imre.a-star.edu.sg)
- **Characterisation of a Ca-alginate based ion exchange resin and its applications in lead, copper and zinc removal**  
Chen, J.P. and Wang, L  
*Separation Science and Technology*, 36:(16), 3617-3637, 2002  
For further information, contact: [l-wang@imre.a-star.edu.sg](mailto:l-wang@imre.a-star.edu.sg)
- **Dried waste activated sludge as biosorbents for metal removal: Adsorptive characterisation and prevention of organic leaching**  
Chen, J.P., Lie, D., Wang, L. and Wu, S.N.  
*Journal of Chemical Technology and Biotechnology*, 77:(6), 657-662, 2002  
For further information, contact: [l-wang@imre.a-star.edu.sg](mailto:l-wang@imre.a-star.edu.sg)
- **Effects of laser parameters on plume characteristics and ablation rate**  
Li Zhongli, Yow Soh Zeom, Lena Lui, Nikolai L. Yakovlev, Peter M. Moran  
*Proceedings of SPIE*, volume 4637: Photon processing in microelectronics and photonics  
For further information, contact: [zl-li@imre.a-star.edu.sg](mailto:zl-li@imre.a-star.edu.sg)
- **Solvation forces in branched molecular liquids**  
R. Lim and S.J. O'Shea  
*Physical Review Letters*, 88, 24610, 2002  
For further information, contact: [s-oshea@imre.a-star.edu.sg](mailto:s-oshea@imre.a-star.edu.sg)
- **Determination of liquid density with a low frequency mechanical sensor based on quartz tuning fork**  
J. Zhang, C.C. Dai, X.D. Su and S.J. O'Shea  
*Sensors and Actuators B*, 84(2002), 123-128  
For further information, contact: [j-zhang@imre.a-star.edu.sg](mailto:j-zhang@imre.a-star.edu.sg)
- **Morphology and deformation behaviour of PP Nanocomposite**  
Chaobin He, Zeng Tonghua, T. S. Chung  
*IUPAC-Macro 2002, Beijing*  
For further information, contact: [cb-he@imre.a-star.edu.sg](mailto:cb-he@imre.a-star.edu.sg)
- **Transmission electron microscopy observations on fine structures of shish-kebab crystals of isotactic polystyrene by partial melting**  
Liu Tianxi, Tjiu Wuiwui Chauhari, Petermann Juergen  
*Journal of Crystal Growth*, 2002, 243, 218-223.  
For further information, contact: [liu-tx@imre.a-star.edu.sg](mailto:liu-tx@imre.a-star.edu.sg)
- **Fracture and toughening of polyamide 6/organoclay nanocomposites**  
Liu Tianxi, Tjiu Wuiwui Chauhari, Liu Zhehui, He Chaobin, Sue Hung-Jue, Yee Albert F.  
*International Symposium on Polymer Physics, PP'2002 (2-6 July 2002, Qingdao, China)*  
For further information, contact: [liu-tx@imre.a-star.edu.sg](mailto:liu-tx@imre.a-star.edu.sg)
- **Self-assembled supramolecular morphologies in a rigid conjugated polymer**  
Liu Tianxi, Tjiu Wuiwui Chauhari, Liu Bin, Toh Kee Chua, Yu Wanglin, Wang Wei  
*IUPAC World Polymer Congress 2002, 39th International Symposium on Macromolecules (7-12 July 2002, Beijing, China)*  
For further information, contact: [liu-tx@imre.a-star.edu.sg](mailto:liu-tx@imre.a-star.edu.sg)
- **Preparation and characterisation of protein-loaded temperature-sensitive PNIPAAm-PLA and P(NIPAAm-co-DMAAm)-PLA**  
YiYan Yang, ShaoQiong Liu, XueMing Liu, YenWah Tong  
*The 29th Annual Meeting of the Controlled Release Society*  
For further information, contact: [yy-yang@imre.a-star.edu.sg](mailto:yy-yang@imre.a-star.edu.sg)
- **Polyester microspheres as carriers for enzymes**  
Peter Grunwald, YiYan Yang  
*The 29th Annual Meeting of the Controlled Release Society*  
For further information, contact: [yy-yang@imre.a-star.edu.sg](mailto:yy-yang@imre.a-star.edu.sg)
- **Preparation, characterisation, in vitro evaluation of physostigmine-loaded poly(ortho ester) and poly(ortho ester)/PLGA blend sub-micron spheres fabricated by spray drying**  
ChengShu Chaw, YiYan Yang, Shabbir Mochhala  
*The 29th Annual Meeting of the Controlled Release Society*  
For further information, contact: [cs-chaw@imre.a-star.edu.sg](mailto:cs-chaw@imre.a-star.edu.sg)
- **Temperature-sensitive polyacrylamide(s)-modified polylactides as microspheric drug carriers: Synthesis, characterisation and controlled release of BSA**  
XueMing Liu, YiYan Yang, ShaoQiong Liu, Francis Tay  
*The 29th Annual Meeting of the Controlled Release Society*  
For further information, contact: [xm-liu@imre.a-star.edu.sg](mailto:xm-liu@imre.a-star.edu.sg)
- **POE/PLGA double walled microspheres: Fabrication and characterisation**  
Meng Shi, YiYan Yang  
*The 29th Annual Meeting of the Controlled Release Society*  
For further information, contact: [yy-yang@imre.a-star.edu.sg](mailto:yy-yang@imre.a-star.edu.sg)
- **Synthesis and characterisation of PtRu/C catalysts from microemulsions and emulsions**  
Zhaolin Liu, Jim Yang Lee, Ming Han, Weixiang Chen, Leong Ming Gan  
*Journal of Materials Chemistry*, 2002, 12, 2453-2458  
For further information, contact: [zl-liu@imre.a-star.edu.sg](mailto:zl-liu@imre.a-star.edu.sg)
- **Synthesis, characterisation and polymerisation kinetics of novel ladder-like polysilsesquioxanes containing side-chain methacrylate groups**  
P. S. G. Krishnan, Chaobin He  
*International Conference on Polymer Synthesis, University of Warwick, UK*  
For further information, contact: [sg-krishnan@imre.a-star.edu.sg](mailto:sg-krishnan@imre.a-star.edu.sg)
- **Architectural effects of precursors on the imidization processes and other properties of aromatic polyimides, I. Effects of polyimide precursors on thermal imidization behaviour**  
Yuejin Tong, Pramoda Palathadka, and Rohitkumar H. Vora  
*Plastic Rubber Composite* 2002, 31(5), 1-5  
For further information, contact: [yj-tong@imre.a-star.edu.sg](mailto:yj-tong@imre.a-star.edu.sg)

### Publications - JULY 2002

- **Announcement of a round robin on the analysis of the peel test**  
Cotterell, B., Williams, GJ, Hutchinson, JW, Thouless, M  
*International Journal of Fracture*  
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