

國科會自然處  
化學研究推動中心通訊

第一〇三期

九十九年七月

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## 最新消息

第204次(99.6.25)中心審議會決議如下:

- (一) 同意補助下列十五位教授為中心訪問教授，生活費補助以不超過七天為限，並須給三場以上學術演講及繳交訪問報告。請推薦人儘可能配合訪問學者之來訪舉辦研討會或至中南部及東部各大學相關科系訪問演講以促進學術交流。

姓名、來訪日期及推薦人	主要專長	現職	備註
1. He Chuan 99年10月擇日訪台七天 陸天堯教授	chemical biology, microbiology, bioinorganic chemistry, cell biology and structural biology	Associate Professor, University of Chicago, USA	補助生活費及機票費
2. Matthias Beller 99年11月擇日訪台七天 陸天堯教授	Homogeneous catalysis and organic synthesis、P- and N-ligand synthesis、Organometallic chemistry	Professor, The Georg-August-Universität Göttingen, Germany	補助生活費及機票費
3. John Malcolm Dyke 99.10.20-10.26 李遠鵬教授	物理化學、化學動力學、光譜學、同步輻射、大氣化學	Professor, University of Southampton, U.K.	補助生活費及機票費
4. 劉崗 99.11.21-11.27 劉如熹教授	光催化觸媒材料之研究	中國科學院金屬研究所副研究員	補助生活費及機票費
5. Christopher J. Chang 99.10.30-11.6 王雲銘教授	Principal research interests involve Bioinorganic Chemistry, Inorganic and Organic Chemistry	Associate Professor, UC Berkeley, Dept of Chemistry, USA	補助生活費及機票費並請再加一場演講
6. Robert A. Scott 99.10.30-11.6 洪政雄教授	Biochemical and biophysical measurements and post-genomic approaches to the study of systems of importance in environmental sciences	Distinguished Research Professor, University of Georgia, USA	補助生活費及機票費並請再加一場演講
7. Vincent L. Pecoraro 99.11.1-11.9 張一知教授	Molecular biology in emphasize on bioinorganic chemistry	Professor, University of Michigan, USA	補助生活費及機票費
8. William B. Tolman 99.10.30-11.6 李位仁教授	synthetic bioinorganic and organometallic/polymer chemistry	Professor, University of Minnesota, USA	補助生活費及機票費並請再加一場演講
9. Sean J. Elliott 99.10.31-11.6 俞聖法博士	Biochemistry, Bioinorganic chemistry, Electrochemistry	Professor, Metcalf Center for Science and Engineerin, USA	補助生活費及機票費並請再加一場演講
10. Lawrence Que, Jr 99.10.30-99.11.6 許鐸芬教授	biological methods and inorganic synthesis with a range of spectroscopic and kinetic techniques to investigate how iron can activate dioxygen to carry out metabolically important and chemically interesting reactions.	Professor, University of Minnesota, USA	補助生活費及機票費並請再加一場演講
11. Jorge G. Ibanez 99.8.7-8.14 邱美虹教授	Micro-scale Chemistry Electrochemistry Analytical chemistry	Coordinator and Professor, Universidad Iberoamericana, D. F. Mexico	補助生活費及機票費

姓名、來訪日期及推薦人	主要專長	現職	備註
12. Akira Fujishima 99.8.7-8.14 邱美虹教授	Photoelectrochemistry TiO <sub>2</sub> Photocatalysis Photofunctional Materials	President of the Tokyo University of Science, and professor emeritus of the University of Tokyo, Japan	補助生活費 及機票費並 建議至淡江 大學給一場 演講
13. Raymond A. Dwek 99.10.11-10.16 方俊民教授	Glycobiology, sequencing of oligosaccharide structures, glycosylation of antibodies and their changes in disease states, glycosylation inhibitors for antiviral agents	Director, Oxford Glycobiology Institute UK	補助生活費 及機票費並 請再加一場 演講
14. 孫紅哲 99.10.18-10.26 俞聖法博士	生物無機化學；化學生物 學/結構生物學；金屬組學	Professor, University of Hong Kong	補助生活費 及機票費並 建議安排至 高學或台南 相關大學訪 問
15. Jong-In Hong 99.11.7-11.16 鍾文聖教授	Chemosensors for biological or clinical important ions and molecules, sensor arrays, cell imaging	Professor, Seoul National University, Korea	補助生活費 及機票費

(二) 同意推薦下列九位教授為國科會國際科技人士短期訪問教授，生活費補助以不超過七天為限，並須給三場以上學術演講及繳交訪問報告。請推薦人儘可能配合訪問學者之來訪舉辦研討會或至中南部及東部各大學相關科系訪問演講以促進學術交流。

姓名、來訪日期及連絡人	主要專長	現職	備註
1. Ilan Marek 99.10.18-10.24 汪根權教授	Organic Chemistry	Chair, Sir Michael and Lady Sobell Academic, Israel	補助生活費 及機票費
2. Masahiko Yamaguchi 99.12.5-12.11 陸天堯教授	有機化學合成方法及手性 高分子	Professor, Tohoku University, Japan	補助生活費 及機票費
3. Laurent Nahon 99.10.18-10.22 倪其焜博士	VUV light/matter interaction	Leader, Synchrotron SOLEIL, France	補助生活費 及機票費
4. Takaaki Sonoda 99.10.31-11.6 周大新教授	Organic Fluorine Chemistry Physical Organic Chemistry Chemical Education	Associate Professor, Kyushu University, Japan	補助生活費 及機票費
5. Hiromi Nakai 99.11.4-11.10 游靜惠教授	Quantum Chemistry	Professor, Waseda University, Japan	補助生活費 及機票費
6. Nikonov Georgii Igorovich 99.7.18-7.7.23 季昀教授	Organometallic chemistry Transition metal hydride chemistry	Associate Professor, Brock University, Canada	補助生活費
7. Stephen R. Foley 99.7.18-7.7.23 季昀教授	Inorganic chemistry Organometallic chemistry Polymer synthesis	Assistant Professor, University of Saskatchewan, Canada	補助生活費

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8. Curtis P. Berlinguette 99.7.18-7.7.23 季昀教授	Inorganic chemistry Organometallic chemistry Solar cell	Assistant Professor, University of Calgary, Canada	補助生活費
9. David G. Whitten 99.11.3-11.9 楊吉水教授	Organic and Materials Chemistry	Professor, University of New Mexico, USA	補助生活費 及機票費

(三)同意補助下列研討會經費如下：

會議名稱	補助金額	備註
1. 2010 國科會分析組秋季研討會	62,700 元	請檢據實報實銷
2. 亞洲生物無機化學研討會會前會	75,000 元	請檢據實報實銷

# 國立台灣大學補助各單位舉辦國際學術研討會活動報告

99. 04. 13

<b>會議名稱：</b> 第四屆台日中子和 X 光散射應用研討會	
<b>舉辦日期：</b> 民國 99 年 3 月 8 起至 99 年 3 月 10 日 共 3 天	
<b>主辦機構：</b> (1)國立台灣大學(2)國立清華大學(3)財團法人台灣同步輻射中心	
<b>研討會場地：</b> 宜蘭蘭城晶英酒店會議廳	
<b>主辦人：</b> 牟中原 教授	<b>聯絡電話：</b> +886-2-33665251
<b>1. 原申請書預估出席人數：</b> 80 人	
<b>2. 會議當天實際出席人數：</b> 75 人	
<b>壹. 會議緣起及目的：</b> 為了促進國內學者有效應用 X 光及中子散射方法進行奈米與生物科技的研發工作，希冀藉由此研討會的舉辦，與日本相關方面的研究專家進行會談並交換研究心得，以獲得最新的研究技術，並開展未來台日雙方長期的研究合作，對提昇國內的相關研究有相當大的助益。本項結合台日雙方相關研究學者舉辦之中子散射應用於奈米科技及生物科技相關之生物及軟物質研究研討會將涵蓋 (1)先進之中子散射研究設施及研究技術；(2) 生物細胞膜及其與蛋白質、DNA、peptide 之作用及生物與合成仿生分子之自組裝奈米結構；(3) 生物分子之奈米結構-蛋白質折疊、DNA 團形等等；(4)高分子奈米結構及高分子複合薄膜；(5) 能源科技、生物科技及光電科技相關之奈米材料結構(如燃料與太陽能電池、OLED/PLED, etc.)。預期將可深入探討這些研究課題，以及如何應用最新的中子散射技術協助相關的研究，並建立未來台日長期之合作研究及技術交流，對提昇我國之相關研究發展將有很大助益。	
<b>貳. 會議活動簡介：</b> 本研討會由台灣大學、清華大學與財團法人台灣同步輻射中心共同主辦。經由推選，由台灣大學牟中原教授擔任主席，清華大學林滄浪、何榮銘與陳信龍教授與同步中心鄭有舜博士擔任大會籌備委員。在本次的會議，主辦單位採邀請演講的方式、邀請了 21 位日方學者專家包括日方京都大學金谷利治教授(Professor Toshiji Kanaya)、日本中子科學學會會長 Y. Endo 教授，及台方學者 31 位，針對中子和 X 光散射相關研究領域的發展與趨勢提出專題報告。且特別邀請國際知名之中子散射應用研究專家麻省理工學院(MIT)陳守信(Sow-Hsin Chen)教授進行演講。研討會上雙方互動相當熱烈，預計將可有更進一步之研究合作。藉此會議將可展示及檢討近年雙方初步合作成果，促進更多之雙方合作項目，建立更多的合作管道，包括研究人員及學生的交流，並推廣中子散射技術在國內相關生物、奈米、軟物質及能源科技的應用等。	
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### Special Guests

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Keng-S Liang 梁耕三 (opening talk)	National Synchrotron Radiation Research Center	<a href="mailto:ksliang@nsrrc.org.tw">ksliang@nsrrc.org.tw</a>

肆. 會議議程：

# The Fourth TAIWAN - JAPAN Workshop on Neutron & X-ray scattering

## 7-March ( Sunday )

15:00-18:30	Check in
18:30-19:30	Welcome Dinner

## 8-March ( Monday )

8:30	Registration	
8:50	Opening Address	Chung-Yuan Mou 牟中原
9:00	Opening Lecture : Taiwan Synchrotron Facilities for Soft Matter Research	Liang, Keng-S 梁耕三
9:30	Opening Lecture : Proposal of International Collaborations at JPARC	Yasuo Endoh
10:00	Tea/Coffee break	
<b>Section I Chairperson : An-Chung Su, Mitsuhiro Shibayama</b>		
10:20	Neutron and X-ray Reflectivity Studies on the Adsorption of DNA by Charged Diblockcopolymer and Lipid Monolayers at the Air-Water Interface	Tsang-Lang Lin 林滄浪
10:50	Molecular Aggregation States and Surface Properties of Side Chain Crystalline Fluoroalkylacrylate Polymer Thin Films	Atsushi Takahara
11:20	Studying membrane structure by Small Angle X-ray Scattering (SAXS)	Ming-Tao Lee 李明道
12:00	Lunch	
<b>Section II Chairperson : Rong-Ming Ho, Toshiji Kanaya</b>		
14:00	Swelling Induced Order-Order Transitions of Block Copolymers in Supercritical CO <sub>2</sub> and Appearance of Nano-Cellular and Porous	Hideaki Yokoyama
14:30	Synthesis and Self-Assembly of Rod-Coil Block Copolymer	Wei-Fang Su 林唯芳
15:00	Time-Resolved X-ray Scattering on Mesomorphic Phase Formation and Crystallization of Isotactic Polypropylene	Koji Nishida
15:30	Self-Assembly of Inorganic Nanoparticles in a Block Copolymer Matrix	Chieh-Tsung Lo 羅介聰
16:00-18:00	Tea/Coffee break & Poster Session	
18:40	Dinner	

## 9-March ( Tuesday )

<b>Section III Chairperson : Di-Jing Huang, Maiko Kofu</b>		
8.30	Theoretical Studies on the Structure of Interacting Colloidal Suspensions by Spin-echo Small Angle Neutron Scattering	Wei-Ren Chen 陳威仁
9:00	Dynamics of Polyrotaxane with a Supramolecular Structure	Hitoshi Endo
9:30	Effects of film instability on roughness correlation and nanodomain ordering in ultrathin films of asymmetric block copolymers	Ya-Sen Sun 孫亞賢
10:00	Tea/Coffee break	
<b>Section IV Chairperson : Hsiung Chou, Hideki Seto</b>		
10:20	Multilamellar Structures Induced by Hydrophilic and Hydrophobic Ions Added to a Binary Mixture of D <sub>2</sub> O and Organic Solvent	Kouchiro Sadakane
10:50	Structure and Dynamics of Water Confined in Porous Coordination Polymers	Osamu Yamamuro
11:20	Plenary Lecture : Dynamic Crossover Phenomena in Confined Water and Its Relation to the Liquid-Liquid Critical Point: Experiments and MD Simulations	Sow-Hsin Chen 陳守信
12:20	Lunch	
13:20	Advisory Committee Meeting	
<b>Section V Chairperson : Tsang-Lang Lin, Takeshi Yamada</b>		
14:00	Nanostructure of DNA-Dendrimer Complex Modulated by Dendrimer Charge Density	Hsin-Lung Chen 陳信龍
14:30	Observation of Subunit Kinetics in Proteasome $\alpha$ 7 ring with SANS and SAXS	Masaaki Sugiyama
15:00	Solution structure of the Bacillus subtilis RNA helicase YxiN	Shu-Ying Wang 王淑鶯
15:30	Tea/Coffee break ( Take a Picture )	
<b>Section VI Chairperson : Mau-Tsu Tang, Masaki Takata</b>		
15:50	Advanced Structural Science of Softmaterials at SPring-8	Sono Sasaki
16:20	A small/wide-angle X-ray scattering instrument for structural characterization of air-liquid interfaces, thin films, and bulk specimens	U-Ser Jeng 鄭有舜
16:50	Current status of Horizontal-type Neutron Reflectometer ARISA-II	Norifumi Yamada
17:20	A Spring-Like Behavior of Chiral Block Copolymer with Helical Nanostructure Driven by Crystallization	Yeo-Wan Chiang 蔣酉旺
17:50	Panel Discussion & Closing Address	
18:30	Dinner	

March 8th - 10th , 2010 in Yilan, Taiwan

伍. 活動照片 :



圖一. 餐敘



圖二. 會議



圖三. 合影

陸. 相關附件檔案：

一. 研討會海報

**The fourth TAIWAN - JAPAN**

**Workshop on Neutron & X-ray scattering**  
March 8th - 10th , 2010 in Yilan, Taiwan

第四屆台日中子與  
X光散射應用研討會

**Sponsored by**  
National Synchrotron Radiation Research Center, Taiwan  
National Taiwan University, Taiwan  
National Tsing Hua University, Taiwan  
NSC under the Promotion and user's programs of the  
Taiwan neutron scattering facilities

## 國科會化學推動中心補助學術研討會成果報告表

會議名稱：2010 台灣質譜學會春季專題研討會
舉辦日期：民國 99 年 4 月 9 日 至 民國 99 年 4 月 9 日
主辦機構：台灣質譜學會，國立東華大學化學系                      主持人：何彥鵬
舉辦地點：國立東華大學                      聯絡電話：03-8633592
出席人數：工業界 <u>  17  </u> 人、學術界(含學生) <u>  77  </u> 人 共 <u>  94  </u> 人
<p><u>會議重要成果：</u>（如篇幅不足,另以A4白紙填寫）</p> <ol style="list-style-type: none"><li>1. 會議經過及議程：如附件。</li><li>2. 國外講員其他演講行程：無。</li><li>3. 重要收獲及心得：<p>此次與會的專家學者包括了化學、生物及醫藥領域，對於細菌的分類與鑑定方法、質譜分析與微生物鑑定和臨床醫學上的應用進行詳盡的報告與討論，帶給國內的學者專家及年輕學子們在此領域上的最新研究成果，期望可以促進國內的質譜技術與微生物資訊之交流並加速各相關領域的研究發展，對國內相關領域研究人員應有相當大助益。</p><p>藉由參與此次台灣質譜學會春季專題研討會，由淺入深介紹細菌的分類、質譜分析與微生物鑑定、臨床醫學上的最新發展及應用，經由和來自各領域的與會者進行廣泛地意見交流，使每位與會人士得到更多新的觀念及知識，相信助益良多。</p></li><li>4. 建議：<p>此次會議邀請許多國內專家學者，演講時間比較適中，尤其最後的綜合座談對各個議題與未來趨勢都有明確的討論，讓與會人士可以有較深入的了解，或許可作為其他研討會的參考。希望下次可擴大研討會，並邀請國外學者來演講。</p></li></ol>

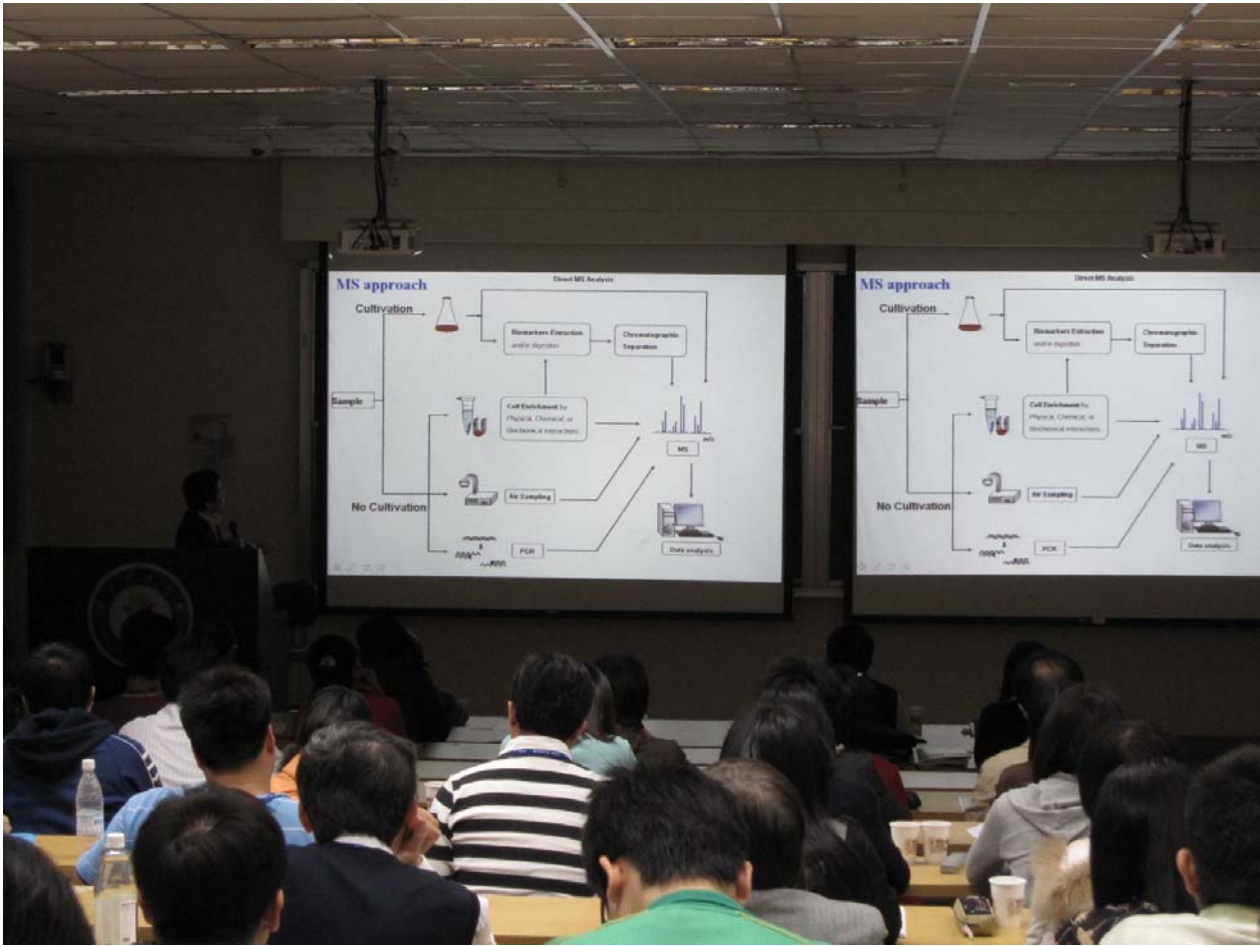
附件：

## 2010 台灣質譜學會春季專題研討會

08:50 — 09:20		註冊 & 報到
09:20 — 09:25		開幕式 林志彪 院長 謝建台 理事長
09:25   09:40	主持人：何彥鵬 教授 (國立東華大學化學系)	質譜分析與微生物鑑定 謝建台 教授 (國立中山大學化學系)
09:40   10:20	主持人：林等義 主任 (慈濟醫院檢驗中心)	細菌的分類與鑑定 謝文陽 教授 (國立台灣大學海洋研究所)
10:20   11:00	主持人：彭文平 教授 (國立東華大學物理系)	<b>Development of Rapid Bacteria Detection Based on a Microfluidic Dielectrophoretic Chip</b> 張憲彰 教授 (國立成功大學醫學工程研究所)
11:00 — 11:20		茶點時間
11:20   12:00	主持人：宣大衛 教授 (國立東華大學生命科學系)	<b>Application of Mass Spectrometry to Identify Clinical Microorganisms</b> 謝森永 教授 (長庚大學生物醫學研究所)
12:00 — 13:30		午餐
13:30   14:10	主持人：張凱誌 教授 (慈濟大學醫學生物技術研究所)	質譜法鑑定微生物的優勢與挑戰 何彥鵬 教授 (國立東華大學化學系)
14:10   14:50		<b>Rapid Identification of Pathogens for Medical Diagnosis by Capillary Electrophoresis and MALDI-TOF Mass Spectrometry</b> 胡安仁 教授 (慈濟大學醫學生物技術研究所)
14:50 — 15:10		茶點時間
15:10   15:50	主持人：吳慧芬 教授 (國立中山大學化學系)	以質譜看細菌 陳月枝 教授 (國立交通大學應用化學系)
15:50 — 17:00		綜合座談







## 國科會化學推動中心補助學術研討會成果報告表

會議名稱：「第 17 屆臺灣大學-首爾大學-東京大學聯合化學研討會」
舉辦日期：民國 99 年 05 月 13 日 至 民國 99 年 05 月 14 日
主辦機構：臺灣大學化學系                      主持人：周必泰教授
舉辦地點：臺大化學系積學館                      聯絡電話：(02) 3366-1148
出席人數：工業界 <u>0</u> 人、學術界(含學生) <u>150</u> 人 共 <u>150</u> 人
<u>會議重要成果</u> ：（如篇幅不足, 另以A4 白紙填寫）
1. 會議經過及議程： <p>臺灣大學、首爾大學、和東京大學化學系為促進單位間之研究交流和合作，多年來輪流舉辦研討會。本次輪到臺大舉辦，本系為擴大交流廣度，本研討會不限定議題，並配合本系一年一度的研究生畢業海報展的活動訂於五月十四日舉辦本次的三校聯合化學研討會。此外，本研討會也是慶祝本系積學館落成之系列活動之一。</p> <p>本次會議友校來賓共 18 位。首爾大學有五位教授與五位學生參加，由 Prof. Chung-Mo Park 朴忠模教授領軍。東京大學有三位教授與六位學生報名，但其中一位學生臨時生病無法前來，由 Prof. Kazuo Tachibana 橘和夫教授率團。雙方均順利於五月十三日下午抵達桃園機場，由本系楊吉水教授與兩名學生前往接機，並由巴士帶往立德台大尊賢會館入駐。</p> <p>交流活動於十三日下午五時展開，來賓先到本系辦理報到手續並領取研討會資料，參觀系史館與松柏和潘貫講堂後，前往鹿鳴堂參加歡迎會，系上多名教授與學生一同出席，畫面溫馨熱鬧。五月十四日八時許，與會人員陸續報到，會議準時開始，由系主任周必泰教授致歡迎詞展開。本次研討會演講議題分別訂為「Materials and Devices」、「Materials and Interface」、「Biochemistry and Chemical Biology」和「Organic Synthesis and Natural Products」分別於松柏與潘貫講堂同時舉辦，中間穿插海報論文、全體合照與校史館的參觀，使來訪學者與學生能充分了解臺大與化學系的各種面貌。最後在水源福利會館的晚宴上為本次研討會畫下完美的句點。下一次的三邊會議將由東京大學接手舉辦。</p>

## Symposium Program

08:30–09:00	<b>Registration (SHENG-KAI Hall)</b>	
09:00–09:15	<b>Opening Remarks (SONG-PEI Lecture Hall)</b> Prof. Pi-Tai Chou (Chair, Department of Chemistry, NTU)	
	<b>Session A-1(SONG-PEI Lecture Hall)</b>	<b>Session B-1(PAN-KUAN Lecture Hall)</b>
	<b>Materials and Devices (Chair: Prof. Man-kit Leung)</b>	<b>Biochemistry and Chemical Biology (Chair: Prof. Lee-Chiang Lo)</b>
09:25–10:00	Prof. Ken-Tsung Wong (NTU) <i>Rational Design of Host Materials for Highly Efficient Electrophosphorescence Devices</i>	Prof. Chung-Mo Park (SNU) <i>Molecular and Biochemical Mechanisms Underlying Genome Expression</i>
10:00–10:35	Prof. Yutaka Matsuo (UT) <i>Organic Photovoltaic Devices Using Bis(silylmethyl)[60]fullerenes (SIMEFs) as New Electron Acceptor Materials</i>	Prof. Seketsu Fukuzawa (UT) <i>Symbiotic Relationship Through Norzoanthamine, an Anti-Osteoporotic Marine Alkaloid</i>
10:35–11:10	Prof. Seonghoon Lee (SNU) <i>The Energy-Gradient Quantum Dots, Exciton Recombination, and Quantum Dot Light-Emitting Devices (QLEDs)</i>	Prof. Richard Cheng (NTU) <i>Effect of Highly Fluorinated Amino Acids on Secondary Structure Stability</i>
11:10–12:10	<b>Coffee Breaks and Poster Session I</b>	
12:10–12:20	<b>Photos</b>	
12:20–13:50	<b>Lunch (Buffet at Room 281)</b>	
14:00–15:00	<b>Gallery of NTU History</b>	
15:10–15:40	<b>Coffee Breaks and Poster Session II</b>	
	<b>Session A-2(SONG-PEI Lecture Hall)</b>	<b>Session B-2(PAN-KUAN Lecture Hall)</b>
	<b>Materials and Interface (Chair: Prof. Chun-Chung Chan)</b>	<b>Organic synthesis and natural products (Chair: Prof. Yeun-Min Tsai)</b>
15:40–16:15	Prof. Taek Dong Chung (SNU) <i>Electrochemistry at Nanoporous Interface</i>	Prof. Jim-Min Fang (NTU) <i>Synthetic Substrates for Study of Transglycosylation in Bacterial Cell Wall Formation</i>
16:15–16:50	Prof. Soofin Cheng (NTU) <i>Anion-Exchange Induced Phase Transformation of Mesoporous Silica</i>	Prof. Chulbom Lee (SNU) <i>Chemical Synthesis of Complex Natural Products via Organometallic Catalytic Approaches</i>
16:50–17:25	Prof. Jung Sang Suh (SNU) <i>Fabrication of Graphene Using Thermal Plasma Jet</i>	Prof. Kazuo Tachibana (UT) <i>Self-Resistance of Marine Animals to Their Own Possessing Strong Toxins: a Case of Marine Sponge, Halichondria okadai</i>
17:25–17:35	<b>Breaks</b>	
17:35–17:50	<b>Closing Remarks (SONG-PEI Lecture Hall)</b> Prof. Kazuo Tachibana (UT) and Prof. Chung-Mo Park (SNU)	
18:20–	<b>Banquet</b>	

## 2. 國外講員其他演講行程：

此次專程來台參與會議的五位首爾大學教授與三位東京大學教授，均為本研討會之「邀請演講」講員，並全程參與研討會的各项活動，故未安排其他演講行程。

## 3. 重要收獲及心得：

首爾大學與東京大學分別是南韓與日本最著名的大學，彼此間之學術交流對我方研究有激勵效果，此外，透過本研討會，可逐漸建立三邊的友誼，對未來研究合作均有很大的助益。

## 4. 建議：

受限於經費，研討會的規模相當有限，交流時間也受到限制。



圖一：演講者與部分與會人員合影



圖二：研討會海報展覽實況

# 國科會化學推動中心補助學術研討會成果報告表

會議名稱：第十六屆分析化學技術交流研討會
舉辦日期：民國 99 年 05 月 15 日 至 民國 99 年 05 月 16 日
主辦機構：國家科學委員會 主持人：張煥宗 教授
舉辦地點：國立臺灣大學化學系館 聯絡電話：3366-1171
出席人數：工業界 <u>11</u> 人、學術界(含學生) <u>369</u> 人 共 <u>380</u> 人
<p>1. 會議經過及議程</p> <p>第十六屆分析化學技術交流研討會，於民國 99 年 05 月 15 及 16 日（星期六及日），假台灣大學（化學系積學館）舉行，本次研討會有兩大主題：『分析化學現今之發展及研究新趨勢』與『分析化學教育如何培育企業界所需之人才』。本次研討會邀請到二十位專家學者與八位傑出企業人士，分別進行兩場大會演講，八場主題演講，十場邀請演講及八場廠商技術報告。此外，應屆博士生及碩士生（共 112 位學員）分別以生醫檢測、奈米科技、電化學、電泳、層析、質譜、光譜、奈米檢測及生物分析共九種不同的領域進行分組報告。</p> <p>大會晚宴前進行分析論壇，邀請廖文峯處長、楊士成教授、謝建台教授、陳俊顯教授以及徐文章博士，分享撰寫高等級國際期刊技巧以及申請國科會計劃相關事宜；此外並邀請 Michael R. Hoffmann 教授進行專題演講（分析化學與環境化學技術）。</p> <p>藉此會議，分析小組成員進行下一任召集人選舉，並開票選出台灣大學化學系陳俊顯教授為下一屆分析小組召集人。</p> <p>大會於台灣大學化學系主任周必泰教授、化學中心主任林英智教授、彭旭明院士致歡迎詞後，由分析小組召集人張煥宗教授宣佈正式展開。相關演講主題如下：</p> <p><b>1. 大會演講</b></p> <p>L01 5/15, 09:40~10:20 Iowa State University, Professor Edward S. Yeung “Understanding Chromatography One Molecule at a Time”</p> <p>L02 5/16, 09:10~09:50 Masaryk University, Professor Jan Preisler “A Multidetector Platform for Microcolumn Separations”</p> <p><b>2 主題演講</b></p> <p>M01 5/15, 10:40~11:10 國立中興大學 曾志明 教授 “Carbon Electrode: It Is Not Just That Simple”</p> <p>M02 5/15, 10:40~11:10 國立交通大學 陳月枝 教授 “Ultrasonication-Assisted Spray Ionization Mass Spectrometry”</p> <p>M03 5/15, 14:00~14:30 國立中山大學 江旭禎 教授 “ICP-MS 於微量元素及物種型態分析之應用”</p> <p>M04 5/15, 14:00~14:30 國立成功大學 孫亦文 教授 “Ionic Liquids for Electrochemistry”</p> <p>M05 5/16, 10:10~10:40 國立中興大學 楊吉斯 教授 “Preparation of Active Substrates for Surface-Enhanced Raman Scattering (SERS) Measurements”</p> <p>M06 5/16, 10:10~10:40 國立中正大學 陳皓君 教授 “The Trend in Using Stable Isotope Dilution Nanoflow Liquid Chromatography Nanospray Ionization Tandem Mass Spectrometry for DNA Adduct Analysis”</p> <p>M07 5/16, 13:30~14:00 國立中山大學 曾韋龍 教授 “以金奈米粒子萃取胺基酸硫醇並結合毛細管電泳進行偵測”</p> <p>M08 5/16, 13:30~14:00 國立清華大學 吳劍侯 教授 “Activation of Hydrogen Peroxide by Cu(II)/Amino-Acid Complexes”</p>

### 3.邀請演講

- N01 5/15, 14:30~14:50 國立嘉義大學 古國隆 教授 “Activity Assay and Structure Identification of Flavonoid Glycosides by LC-ECD-ESI-MS”
- N02 5/15, 14:30~14:50 國立暨南國際大學 曾惠芬 教授 “Simultaneous Determination of Inosine and Hypoxanthine by Capillary Electrophoresis as a Rapid Monitoring Tool for Purine 5'-Nucleotidase Activity”
- N03 5/15, 14:50~15:10 國立中興大學 賴建成 教授 “A Novel Approach for Quantitative Peptides Analysis by Selected Electron Transfer Reaction Monitoring”
- N04 5/15, 14:50~15:10 高雄醫學大學 馮嘉嫻 教授 “Determination of the Anti-hypertensive Drugs Acting on the Renin-Angiotensin System”
- N05 5/16, 10:40~11:00 台北醫學大學 麥富德 教授 “Risk Evaluation of Nano-TiO<sub>2</sub> and Nano-ZnO on HepG2 Cell by a Novel Imaging Association System
- N06 5/16, 10:40~11:00 國立台灣大學 郭錦樺 教授 “Characterization of Chinese Herbal Medicine Using Chromatographic Fingerprint and Chemometrics”
- N07 5/16, 11:00~11:20 國立台灣科技大學 張家耀 教授 “Functionalization of Double-Walled of Carbon Nanotubes with Radical Initiators for the Adhesion of PtRu Nanoparticles”
- N08 5/16, 11:00~11:20 國立台灣師範大學 呂家榮 教授 “微型氣相層析儀之研製”
- N09 5/16, 11:20~11:40 慈濟大學 胡安仁 教授 “A Comparative Study and Analysis of *Acinetobacter Baumannii* Bacteriophage Proteome by Integrated On-line and Off-line 2D-LC-MS/MS”
- N10 5/16, 11:20~11:40 高雄醫學大學 陳泊余 教授 “Electrodeposition of Macroporous Metals and Electrocatalytic Alloys from Ionic Liquids: Is It Possible to Apply these Electrodes in Electroanalysis?”

同時段共有九至十位同學進行口頭報告（題目及摘要請見網頁 <http://www.ch.ntu.edu.tw/ac2010/index.html>）。研究方向多元且成果豐碩，顯現分析小組無限的研究能量。會議進行中，同學專心報告及聆聽的態度，亦值得讚賞。

### 2. 重要收穫及心得

研討會中，與會人員互動熱絡及討論熱烈，充分展現出此次研討會的成功。會中，邀請了三位國際學者、國內優秀資深及年輕化學家，介紹許多重要且新穎分析技術及課題，對與會學者與學生均具有相當的幫助，成效極為卓著。此外，此次研討會邀請企業界人士與會，加強理論與實務結合，更能培養出企業所需求之分析化學專業人才。畢業生亦利用此次難得機會，訓練報告及交流技巧，有助於學生畢業後之於職場之發展。

此次研討會承蒙各級長官、化學界及企業界朋友鼎力相助，特表謝意。海洋大學黃志清教授、本研究室林泱蔚博士、黃明峰博士、楊儒興博士、蔡孟庭小姐及同學與黃志清教授研究室之同學們的積極投入與籌畫，本人也一併致上最誠懇之謝意！

## 國科會化學推動中心補助學術研討會成果報告表

會議名稱：2010 無機錯鹽研討會
舉辦日期：民國 99 年 04 月 30 日 至 民國 98 年 04 月 30 日
主辦機構：化學中心無機錯鹽小組      主持人：王志傑
舉辦地點：東吳大學國際會議廳      聯絡電話：(02)28819471 轉 6824
出席人數：工業界___人、學術界(含學生) <u>150</u> 人 共 <u>150</u> 人
1. 會議經過及議程 2. 國外講員其他演講行程 3. 重要收獲及心得 4. 建議



## 會議經過及議程

2010 年無機錯鹽小組研討會於民國九十九年 4 月 30 日（星期五）假東吳大學國際會議廳舉行，會議邀請到九位在無機化學相關領域之教授擔任講座演講，此次研討會共分成四個時段，相關議程表如後附件表一。

研討會於上午 09:00 正式開始，首先由東吳大學理學院院長傅明仁教授主持開幕式。第一個時段邀請兩位教授演講，由淡江大學化學系徐秀福教授擔任主持人，第一場演講於 09:10—09:45 由清華大學化學系王素蘭教授主講，演講的題目為 Discovering New Chemistry within Deep Eutectic Solvent --- Synthesis of Organic-Inorganic Hybrid Materials with Photoluminescence and Photochromism，其摘要如下：

Interest in organic-inorganic hybrid materials has spiked recently due to the emerging discovery of novel structures and interesting properties. The system of organic templated metal phosphate/phosphite especially stood out over the past ten years for its performance in application like gas sorption, hydrogen gas storage and photoluminescence. Our recent study on metal phosphate/phosphite made several breakthroughs on creating novel structures, discovering new chemistry and intriguing property. NTHU-7 is an organically templated gallium oxalatophosphite with unprecedented nanotubular structure synthesized using deep eutectic solvent (DES). It is a yellow-green phosphor without additive of lighting element. Following NTHU-7, we successfully prepared an organo-metallophosphate (OMPO), NTHU-8, which is the first 3-D OMPO containing nanometer-sized channels with intriguing bimodal porosity and hydrogen gas storage property. The unique adsorption property grants NTHU-8 potential in application of hydrogen storage. In addition, our latest study on choline-based DES synthesis reveals new chemistry on the demethylation and hydrolysis of choline ion which further reacts with organic components to generate novel hybrid zinc phosphate, NTHU-9. Moreover, NTHU-9 is a metal-activator-free orange phosphor with its dual photo-generated properties, photoluminescence and photochromism, reported for the first time. Along with the characterization of NTHU-9, the versatility of DES was discovered to unusually extend to the oftentimes stable component, choline ion, which

was proved for the first time to adopt two concurrent pathways of reactions: one evolved methylium ion which led to the N,N'-dimethylation of amine templates and to the formation of photochromic material; the other evolved ethylene glycol molecule which entered and endowed "fluorophores" to the layered NTHU-9 with distinctive orange photoluminescence.

第二場演講於 09:45-10:20 由中央大學化學系賴重光教授主講，演講的題目為 Molecular Architecture in Metallomesogenic Materials，其主要內容的重點如下：

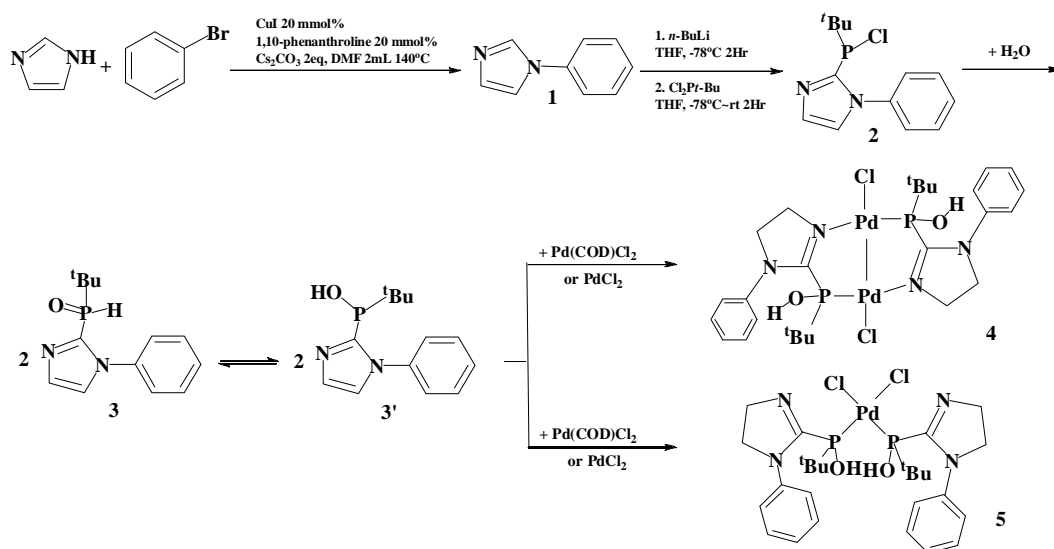
Metal-containing liquid crystals; or so-called metallomesogens have been paid much attention during the past decades. Numerous transition metal complexes with a variety of geometric structures were thus generated, and their mesomorphic properties investigated as well. In general, any atoms incorporated within organic moieties; such as nitrogen, oxygen, sulfur or others might provide electron lone pairs for potential coordination sites to the transition metals. Depending on the structure of the molecular structures, a variety of metal ions, particularly 3d-metals were structurally possible in generating this type of metallomesogenic materials. As we are all already known, the formation of mesophases was often determined by molecular shapes. Metal ions with a coordination number of two, three, four, six and higher were commonly used to generate central cores with a trigonal, tetrahedral, square planar and octahedral geometry. Metal ion can be paramagnetic or diamagnetic configuration.

Heterocyclic rings have been used as core group, and many novel compounds exhibiting unique mesophases were prepared and studied. Among them 5- or 6-membered rings have been studied most due to their varieties in structures and/or known chemistry. Better mesomorphic behavior formed by such structures was often accomplished, which was attributed to their electronic unsaturation and/or more polarizable ability. Also most heterocyclic molecules with a lower symmetry and/or non-planar structure caused by nitrogen, oxygen, sulfur or other heteroatoms incorporated would be easily obtained, leading to practical materials with a lower clearing or/and melting temperature useful in device applications. In this presentation, a few metallomesogenic structures derived from heterocyclic moieties; such as benzoxazole, 1,2,4-oxadiazole and others will be presented and discussed.

第二個時段的演講由東吳大學化學系王志傑教授擔任主持人，第一場演講於 10:50 – 11:25 由中興大學化學系洪豐裕教授主講，演講的題目為 Preparation and

Application of Buchwald Type Secondary Phosphine Oxide Ligands, 其摘要如下:

A secondary phosphine oxide (SPO) 2-(t-butylhydrophosphoryl)-1-phenyl-1H-imidazole (**3**) was prepared from the reaction of P(<sup>t</sup>Bu)Cl<sub>2</sub> with deprotonated 1-phenyl-1H-imidazole (**1**). A tautomeric equilibrium exists between **3** and its isomeric form 2-(hydroxy(t-butyl)phosphino)-1-phenyl-1H-imidazole (**3'**) (Scheme 1).



Scheme 1

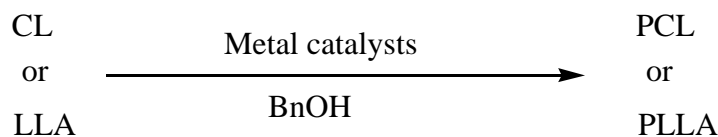
Further reaction of **3'** with one molar equivalent of Pd[COD]Cl<sub>2</sub> gave the products Pd<sub>2</sub>Cl<sub>2</sub>(**3'**)<sub>2</sub> (**4**) and *cis*-PdCl<sub>2</sub>(**3'**) (**5**) (Scheme 1). Crystal structures of **4** and **5** were determined by X-ray diffraction methods. Both R- and S-forms of **3'** were observed in the coordination to Pd(s) in **4** and **5**. Obviously, two racemic isomeric forms of **3'** were produced in equal molarity previously.

So far, not many asymmetric hydrogenation reactions of imines were reported. These reactions normally led to the production of optically active amines with unsatisfactory e.e. values. Asymmetric hydrogenation of imine was proposed using enantiopure form of SPO such as **3** after optical resolution.

第二場演講於 11:25–12:00 由中興大學化學系陳繼添教授主講，演講的題目為 Metal Complexes Bearing Pyrazole-Functionalized Ligands as Catalysts for Ring Opening Polymerization, 其摘要如下:

Some aluminum, magnesium and zinc complexes bearing pyrazole-functionalized ligands are described. Reactions of ligand precursors, HNArPz or HOPh<sup>R</sup>(CH<sub>2</sub>)Pz, with AlMe<sub>3</sub>, Mg<sup>n</sup>Bu<sub>2</sub> or ZnEt<sub>2</sub> afford mono-nuclear or dinuclear metal complexes. These metal

complexes show excellent catalytic activities toward the ring-opening polymerization of  $\epsilon$ -caprolactone or L-lactide.



12:00–13:40 為午餐兼學術交流時間，與會教授於國際會議廳旁邊之 B013 室用餐，用餐時間約於 12:40 結束，用餐結束後由王如春教授帶領與會之教授們參觀東吳大學美麗的校園風景，隨後返回演講廳並由彰化師範大學化學系黃瑞賢教授主持下午第三個時段的會議演講。13:40–14:15 的演講由台灣師範大學化學系謝明惠教授主講，演講的題目為 Copper-Bridged Group 8 Chalcogenide Carbonyl Complexes: From Clusters to Semiconducting Polymers，其主要內容的重點如下：

A series of copper halide-incorporated ruthenium and iron carbonyl clusters are systematically synthesized. Their formation and electrochemical properties are studied in terms of the effects of halides, chalcogen elements, and the size of the clusters with the aid of theoretical calculations. In particular, several copper-bridged ruthenium or iron telluride carbonyl cluster polymers can be prepared and structurally characterized, which demonstrate surprising semiconducting properties. The Cu(Br)CuCl-bridged Te<sub>2</sub>Ru<sub>4</sub>-based octahedral cluster chain polymer  $[\{\text{PPh}_4\}_2\{\text{Te}_2\text{Ru}_4(\text{CO})_{10}\text{Cu}_4\text{Br}_2\text{Cl}_2\} \cdot \text{THF}]_\infty$ , from the reaction of K<sub>2</sub>TeO<sub>3</sub> and Ru<sub>3</sub>(CO)<sub>12</sub> followed by treatment with PPh<sub>4</sub>Br and CuCl, represents the first known ternary Te—Ru—Cu cluster and shows semiconducting properties with a low energy gap of  $\sim 0.37$  eV. On the other hand, the unprecedented ternary Te—Fe—Cu chain polymers  $[\{\text{Et}_4\text{N}\}\{\text{TeFe}_3(\text{CO})_9\text{Cu}\}]_\infty$  and  $[\{\text{TeFe}_3(\text{CO})_9\text{Cu}_2\}\{\mu\text{-}4,4'\text{-dipyridyl}\}_{1.5}]_\infty$  were prepared from the self-assembly of [Et<sub>4</sub>N]<sub>2</sub>[TeFe<sub>3</sub>(CO)<sub>9</sub>] with [Cu(MeCN)<sub>4</sub>][BF<sub>4</sub>] in THF or in the presence of 4,4'-dipyridyl in THF. These two chain polymers show semiconducting behaviors with the low band gaps of  $\sim 0.59$  and  $\sim 0.41$  eV, respectively. The conductivity and the effect of the bridging ligands of these semiconducting cluster polymers are further elucidated by theoretical calculations.

14:15–14:50 的演講由中央研究院化學所余聖法教授主講，演講的題目為 NO Trafficking Studies of *E. coli* Transcriptional Factors that Contain Iron-Sulfur Clusters，其主要內容的重點如下：

SoxR protein is a transcriptional factor belonged to a member of the Mer family. The native form of the protein is presented as a dimeric structure and each monomer contains a redox-active [2Fe-2S] center. The iron-sulfur cluster of SoxR is responsive to one electron oxidation by oxidative stresses and resulted in subsequent expression of *soxS* gene for the rescue of oxidative stress such as the expression of superoxide dismutase or catalase. In addition to superoxide, SoxR is also sensitive to nitric oxide (NO) and its nitrosylated protein displayed paramagnetic features where its average *g* value is appeared at 2.03 in EPR. Despite the crystal structures of SoxR protein with and without the nucleic acids have already been unraveled [1], there is still not sufficient structural information to illustrate how the regulations mediated by redox chemistry or NO modulation [2] would lead with the transcriptional activation. In this study, we employed the x-ray absorption spectroscopic methods to determine the structural insights of metal active sites in SoxR under the oxidized, reduced and nitrosylated conditions, respectively. We anticipate clarifying the major clues that control the corresponding gene regulations resulted from oxidative or nitrosative stress.

14:50—15:10 為休息時間，接下來第四時段由中山大學化學系梁蘭昌教授擔任主持人，15:10—15:45 第一個演講由交通大學化學系李積琛教授主講，演講的題目 Synthesis and Characterization of Quaternary Selenides，其主要內容的重點如下：

Chalcogenides that contain heavy main-group elements exist in minerals and synthetic compounds, which possess many attractive properties that make it highly promising for diverse applications. Using solid state reaction, new chalcogenides with new structure type and interesting properties can be prepared. In this presentation, a number of examples will be described to demonstrate the synthesis of quaternary selenides and the effect of compositions on their structure and properties.

1)  $\text{InSn}_2\text{Bi}_3\text{Se}_8$  and  $\text{In}_{0.2}\text{Sn}_6\text{Bi}_{1.8}\text{Se}_9$ : These compounds feature three-dimensional frameworks containing NaCl-(311) type slabs with varied thicknesses. Calculations of the electronic structure and measurements of electrical conductivity indicate that these materials are semiconductors with narrow band gaps.

2)  $\text{Pb}_4\text{In}_x\text{M}_{6-x}\text{Se}_{13}$  ( $\text{M} = \text{Bi}, x = 2.1-2.8$ ;  $\text{Sb}, x = 2$ ): The structure features a three-dimensional framework consisting of Z-shaped ribbon units and corner-sharing infinite one-dimensional  $[\text{InSe}_4]_\infty$  chains connected by Pb atoms. Calculations of electronic structure revealed the effect of replacing Bi by In on M-Se interactions, and the phase width is controlled by the molar ratio In/Bi in  $\text{Pb}_4\text{In}_x\text{Bi}_{6-x}\text{Se}_{13}$ .

3)  $\text{Sn}_2\text{Pb}_5\text{Bi}_4\text{Se}_{13}$  and  $\text{Sn}_{8.65}\text{Pb}_{0.35}\text{Bi}_4\text{Se}_{15}$ : These compounds exhibit topochemical

cell-twinning of NaCl-type structures with lillianite homologous series L(4, 5) and L(4, 7) for  $\text{Sn}_2\text{Pb}_5\text{Bi}_4\text{Se}_{13}$  and  $\text{Sn}_{8.65}\text{Pb}_{0.35}\text{Bi}_4\text{Se}_{15}$ , respectively. Measurements of electrical conductivity indicate that these materials are semiconductors with narrow band gaps;  $\text{Sn}_2\text{Pb}_5\text{Bi}_4\text{Se}_{13}$  is *n*-type, whereas  $\text{Sn}_{8.65}\text{Pb}_{0.35}\text{Bi}_4\text{Se}_{15}$  is a *p*-type semiconductor.

4)  $\text{Sn}_{3-\delta}\text{Pb}_\delta\text{Bi}_2\text{Se}_6$  ( $\delta = 0.0\text{--}0.7$ ): The structures of these compounds are related to that of  $\text{Pb}_3\text{Bi}_2\text{S}_6$  with an atomic position near the cell-twinning plane. Band structure calculations confirmed that the structure is stabilized when the position of the M5 site is farther from the cell-twinning plane. All compounds are *n*-type semiconductors with small band gaps.

15:45 – 16:20 第二場演講由成功大學化學系許桂芳教授主講，演講的題目為 Synthesis and Characterization of Three Ytterbium Coordination Polymers Featuring Various Cationic Species and a Luminescence Study of a Terbium Analogue With Open Channels，其主要內容的重點如下：

Four novel metal-organic frameworks with 4,4'-oxybis(benzoate) (OBA) ligands and suitable cationic species,  $[\text{NH}_3(\text{CH}_2)_2\text{NH}_3]_{0.5}[\text{Yb}(\text{OBA})_2(\text{H}_2\text{O})]$  (**1**),  $(\text{NH}_4)[\text{Yb}(\text{OBA})_2(\text{H}_2\text{O})_2]$  (**2**),  $\text{Na}[\text{Yb}(\text{OBA})_2]\cdot 0.4\text{DMF}\cdot 1.5\text{H}_2\text{O}$  (**3**) and  $\text{Na}[\text{Tb}(\text{OBA})_2]\cdot 0.4\text{DMF}\cdot 1.5\text{H}_2\text{O}$  (**4**), have been synthesized and structurally characterized. The two-dimensional structure of **1** possesses open channels filled with ethylenediamine cations. The two-dimensional structure of **2** contains the network featuring organic ligands with uncoordinated functional  $\text{RCO}_2$  groups suspended within the windows. The three-dimensional structure of **3**, in which  $\text{Na}^+$  cations replaced the  $\text{NH}_4^+$  cations of **2** and the presence of DMF molecules, adopts an open framework with large rhombic channels. The evacuated phase “ $\text{Na}[\text{Yb}(\text{OBA})_2]$ ” in **3** retained rigidity and crystallinity to a high temperature. Framework **4**—a terbium analogue of **3**—has the potential sensing ability; it exhibited gradually increasing luminescence intensities when dispersed sequentially in water, methanol, and ethanol as suspensions.

16:20 – 16:55 為第三場演講由東吳大學化學系何美霖教授主講，演講的題目為 Syntheses, Structures and Photoluminescent Properties of Silver(I) Complexes with oligo- $\alpha$ -pyridylamido ligand，其主要內容的重點如下：

Four silver complexes with *N,N'*-di(pyrazin-2-yl)pyridine-2,6-diamine (**H<sub>2</sub>dpzpd**) as ligand,  $[\text{Ag}_2(\text{H}_2\text{dpzpd})_2](\text{ClO}_4)_2$  (**1**),  $[\text{Ag}_2(\text{H}_2\text{dpzpd})_2(\text{ClO}_4)_2](\text{DMF})_2$  (**2**),  $[\text{Ag}_2(\text{H}_2\text{dpzpd})_2](\text{CF}_3\text{SO}_3)_2$  (**3**), and  $[\text{Ag}_2(\text{H}_2\text{dpzpd})_2](\text{PF}_6)_2(\text{DMF})_2$  (**4**) have been

synthesized and structurally characterized by IR spectroscopy and single crystal X-ray crystallography. X-ray crystallography has revealed that structures **1** and **3** are bimetallic supramolecular rectangles in which two **H<sub>2</sub>dpzpd**a ligands are connected by two linearly coordinated Ag(I) ions. The structure of complex **2** is best described as an infinite 1D chain. Surprisingly, complex **4** is characterized to be a 1D ladder-like infinite chain. The influences of counter anions on the resulting structures as well as photoluminescent properties will be discussed. Moreover, to expand our long-term interest in materials suitable for application in luminescent devices, two photon excitation properties and two photon absorption cross section of complex **2** in the solid state is also discussed.

整個學術演講於 17:05 圓滿結束。此次研討會承蒙國科會自然處化學中心經費資助，東吳大學提供演講場地，理學院與化學系在經費上的資助，特此致謝，所有演講之教授、議程主持人，以及所有行政工作負責同仁與服務同學，在此一併致謝。

## 2010 年無機錯鹽小組研討會議程

時間: 99 年 4 月 30 日 (星期五)

地點: 東吳大學雙溪校區國際會議廳(B015)

- 09:00 研討會開始  
致詞
- Chair: 徐秀福教授 (淡江大學化學系)
- 09:10 – 09:45 王素蘭教授 (清華大學化學系)  
講題: Discovering New Chemistry within Deep Eutectic Solvent ---  
Synthesis of Organic-Inorganic Hybrid Materials with  
Photoluminescence and Photochromism
- 09:45 – 10:20 賴重光教授 (中央大學化學系)  
講題: Molecular Architecture in Metallomesogenic Materials
- 10:20 – 10:50 Coffee and Tea break
- Chair: 王志傑教授 (東吳大學化學系)
- 10:50 – 11:25 洪豐裕教授 (中興大學化學系)  
講題: Preparation and Application of Buchwald Type Secondary Phosphine Oxide  
Ligands
- 11:25 – 12:00 陳繼添教授 (中興大學化學系)  
講題: Metal Complexes Bearing Pyrazole-Functionalized Ligands as  
Catalysts for Ring Opening Polymerization
- 12:00 – 13:40 午餐時間 兼 學術交流
- Chair: 黃瑞賢教授 (彰化師範大學化學系)
- 13:40 – 14:15 謝明惠教授 (台灣師範大學化學系)  
講題: Copper-Bridged Group 8 Chalcogenide Carbonyl Complexes: From Clusters to  
Semiconducting Polymers
- 14:15 – 14:50 余聖法教授 (中央研究院化學所)  
講題: NO Trafficking Studies of *E. coli* Transcriptional Factors that Contain  
Iron-Sulfur Clusters
- 14:50 – 15:10 Coffee and Tea break
- Chair: 梁蘭昌教授 (中山大學化學系)
- 15:10 – 15:45 李積琛教授 (交通大學化學系)  
講題: Synthesis and Characterization of Quaternary Selenides
- 15:45 – 16:20 許桂芳教授 (成功大學化學所)  
講題: Synthesis and Characterization of Three Ytterbium Coordination  
Polymers Featuring Various Cationic Species and a Luminescence  
Study of a Terbium Analogue With Open Channels
- 16:20 – 16:55 何美霖教授 (東吳大學化學系)  
講題: Syntheses, Structures and Photoluminescent Properties of Silver(I)  
Complexes with oligo- $\alpha$ -pyridylamido ligand.

17:05 – 17:30 共同討論

主辦單位: 國科會化學研究推動中心(無機錯鹽小組)

協辦單位: 東吳大學化學系暨東吳大學理學院

聯絡人: 無機錯鹽小組召集人王志傑

(Tel: 28819471 ext 6824; email: [ccwang@scu.edu.tw](mailto:ccwang@scu.edu.tw))



## 國科會化學推動中心補助學術研討會成果報告表

會議名稱：2010 年台灣生物無機研討會
舉辦日期：民國 99 年 5 月 8 日
主辦機構：國立清華大學化學系 主持人：廖文峯 教授
舉辦地點：國立清華大學化學系 聯絡電話：(03)571-5131
出席人數：工業界 <u>0</u> 人、學術界(含學生) <u>110</u> 人 共 <u>110</u> 人
會議重要成果：(如篇幅不足,另以A4 白紙填寫)
<p>1. 會議經過及議程</p> <p>本會議假國立清華大學化學系舉行，許多師生參與。經自然處處長廖文峯 教授致詞後，便介紹此會議國外講員 Darensbourg 教授，隨即展開當天的議程。首先於上午 10 時 20 分由 Darensbourg 教授進行第一場演講，講題：Copolymerization Reactions of Carbon Dioxide and Cyclic Ethers – The Intermediacy of Cyclic Carbonates。第二場由李位仁 教授演講，講題：Bio-inspired Asymmetric Catalysts。李建明 教授給第三場演講，講題：Mononuclear Ni<sup>III</sup>–Alkyl Complexes (Alkyl = Methyl and Ethyl): Relevance to the Ni<sup>III</sup>–CH<sub>3</sub> State of Acetyl-CoA Synthase and Methyl-CoM Reductase。皆下來的三場演講講員分別是蔡富得 博士、許智能 教授、許鐸芬 教授。他們的講題各是” Roles of the Distinct Electronic Structures of {Fe(NO)<sub>2</sub>}<sup>9</sup> and {Fe(NO)<sub>2</sub>}<sup>10</sup> DNICs in Modulating Nitrite Binding Modes and Nitrite Activation Pathways”、” Bio-mimetic Modeling System for Copper Nitrite Reductase Active Site”、” Bio-inspired Coordination Chemistry of Vanadium Thiolate Complexes”。</p>
<p>2. 國外講員其他演講行程</p> <p>Darensbourg 教授另於 5 月 6 日〔星期四〕下午 2 點鐘於國立台灣師大化學系進行一場演講，演講題目是” Making Plastics from Carbon Dioxide. Carbon Dioxide – A Waste or a Raw Material”。</p>
<p>3. 重要收穫及心得</p> <p>本次會議著重於生物可裂解共聚合物與生物擬態化合物的應用，會中有許多的交流與討論，可學習到金屬錯合物的設計與應用。在 Darensbourg 教授的演講中，他介紹如何使用二氧化碳與環氧丙烷來製造生物可裂解共聚合物，不僅提供一個降低全球暖化的可行方法，也為環境綠化找到一條出路，且此種聚合物在醫療上有許多應用。其他教授的演講提供我們一個思考的方向，如何從生物系統中的酵素和金屬蛋白質活性中心學習，以合成出類似活性中心的錯合物並具有活性來進行催化反應。</p>
<p>4. 建議</p> <p>此會議應每年舉辦，讓對化學有興趣的學生可有不同角度來學習。</p>

國科會化學推動中心補助學術研討會成果報告表

會議名稱：台灣光化學小組研討會
舉辦日期：民國 99 年 6 月 12 日 至 民國 99 年 6 月 12 日
主辦機構：國立中山大學化學系 主持人：陳國美
舉辦地點：國立中山大學化學系會議室 聯絡電話：07-5252000-3911
出席人數：工業界 <u>0</u> 人、學術界(含學生) <u>27</u> 人 共 <u>27</u> 人
會議重要成果：（如篇幅不足,另以 A4 白紙填寫） <ol style="list-style-type: none"><li>1. 會議經過及議程 會議議程及演講摘要見附件 1。</li><li>2. 重要收穫及心得 演講安排時間較充裕，能有充分討論，見原分所倪其焜教授 e-mail(見附件 2)。 下次研討會定半年後舉行，由交通大學李遠鵬教授主辦。</li><li>3. 建議 本小組成員已增至 30 位，對參與亞洲光化學會會務及年會具正面意義。</li></ol>

## Studying Reaction Intermediates using Time-resolved Fourier-transform Infrared Spectroscopy and *p*-H<sub>2</sub> Matrix Isolation Techniques

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Among several techniques employed in our laboratory for studying transient species in chemical reactions two will be introduced.

We developed the time-resolved Fourier-transform infrared (TR-FTIR) absorption spectroscopy to investigate IR absorption of gaseous transient species. A flow reactor with a multipassing UV photolysis beam and a multipassing IR probe beam is coupled to a step-scan FTIR spectrometer with both dc- and ac-detection to record temporal profiles of the infrared absorption of reaction intermediates. IR absorption spectra of several reactive species such as CH<sub>3</sub>OO [1], CH<sub>3</sub>SO<sub>2</sub> [2], ClCOOH [3], and CH<sub>3</sub>C(O)OO [4] were recorded. Spectral assignments were made based on reaction mechanisms and comparison of observed vibrational wavenumbers and rotational contours with those predicted quantum-chemically. In this talk, the identifications of two conformers of CH<sub>3</sub>C(O)OO and the determination of the relative energy of these conformers will be discussed. In the reaction of CH<sub>3</sub>CO + O<sub>2</sub>, absorption bands with origins at 1851 ± 1, 1372 ± 2, 1169 ± 6 and 1102 ± 3 cm<sup>-1</sup> are attributed to *t*-CH<sub>3</sub>C(O)OO, and those at 1862 ± 3, 1142 ± 4 and 1078 ± 6 cm<sup>-1</sup> are assigned to *c*-CH<sub>3</sub>C(O)OO. A weak band near 1960 cm<sup>-1</sup> is assigned to  $\alpha$ -lactone, *cyc*-CH<sub>2</sub>C(=O)O, a coproduct of OH. The observed relative intensities indicate that *t*-CH<sub>3</sub>C(O)OO is more stable than *c*-CH<sub>3</sub>C(O)OO by 3.0 ± 0.6 kJ mol<sup>-1</sup>. Based on these observations, the branching ratio for the OH +  $\alpha$ -lactone channel of the CH<sub>3</sub>CO + O<sub>2</sub> reaction is estimated to be 0.04 ± 0.01. A simple kinetic model is employed to account for the decay of CH<sub>3</sub>C(O)OO. Preliminary results on CH<sub>3</sub>OSO and CH<sub>3</sub>SO will be presented.

*Para*-hydrogen (*p*-H<sub>2</sub>) has recently emerged as a new matrix host. Because of the 'softness' associated with the extensive delocalization of the H<sub>2</sub> moieties, new characteristics of molecules isolated in this quantum solid are explored. We demonstrated that the internal rotation of methanol persists in solid *p*-H<sub>2</sub> by observation of splittings of the *E/A* torsional doublets in internal-rotation-coupled vibrational modes [5]. We also provided direct spectral evidence that CH<sub>3</sub>F isolated in *p*-H<sub>2</sub> rotates about only its symmetry axis, and not about the other two axes by observation of two weak absorption lines from the *E* (*K* = 1) level and one intense feature from the *A* (*K* = 0) level for degenerate modes  $\nu_4$ – $\nu_6$  of CH<sub>3</sub>F [6]. We demonstrated another feature of solid *p*-H<sub>2</sub>, the absence of cage effect, by reaction of Cl, produced from *in situ* photodissociation of Cl<sub>2</sub>, with CS<sub>2</sub>. Absorption lines of ClSCS, not ClCS<sub>2</sub> or Cl<sub>2</sub>CS<sub>2</sub>, were observed at 1479.5 and 1480.8 cm<sup>-1</sup> [7]. This feature opens up a new method to prepare free radicals by barrierless reactions of atom and molecules. In the reaction of Cl with propene, only 2-chloropropyl radicals, not 1-chloropropyl radicals, and a small amount of dichloropropane, were observed. This demonstrates a preferential attack in the addition reaction of Cl with propene in solid *p*-H<sub>2</sub>. Possible reason for this selectivity will be discussed. We can also produce free radicals via *in situ* photolysis which is difficult in noble-gas matrices. Production of CH<sub>3</sub>S from photolysis of CH<sub>3</sub>SSCH<sub>3</sub>, CH<sub>3</sub>SCH<sub>3</sub>, and CH<sub>3</sub>SH will also be discussed.

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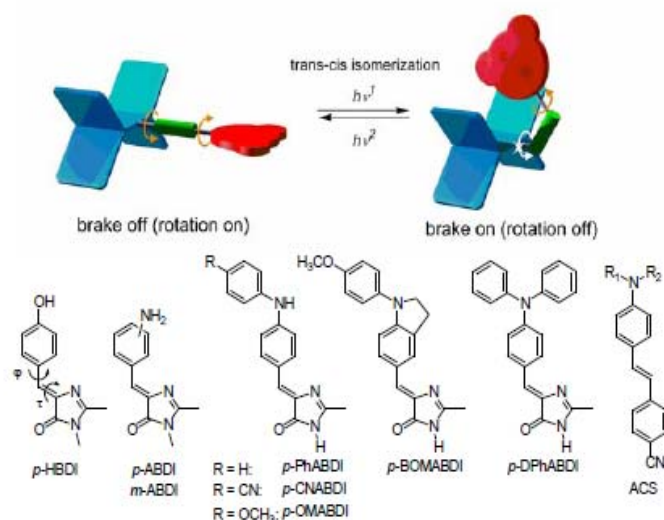
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# Control and Application of *E-Z* Photoisomerization

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Trans-cis (*E-Z*) isomerization is undoubtedly the most important unimolecular photochemical reactions of alkenes. This reaction accounts for many biological activities and artificial molecular photoswitches. In this presentation, I will talk about the *E-Z* isomerization of *trans*-stilbene and its derivatives and the green fluorescence protein (GFP) chromophores. The following issues will be discussed: (a) Substituent effects that suppress the *E-Z* isomerization and thus enhance the fluorescence quantum efficiency of the alkene chromophores; (b) A unique probe based on isomerization and fluorescence quantum yields for the nonradiative decay pathways such as formation of a twisted intramolecular charge-transfer (TICT) state and solute-solvent H-bond-mediated internal conversion; (c) Design of light-driven molecular brakes based on efficient control of the *E-Z* photoisomerization.



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# Energy Transfer Processes in Regioregular Silylene-spaced Copolymers

I-Chia Chen

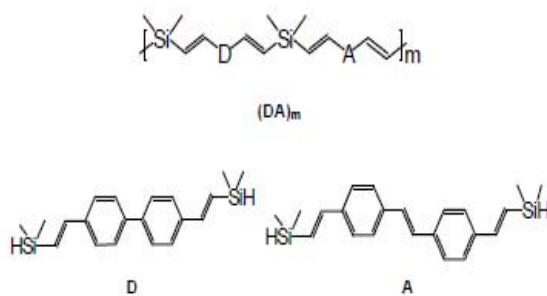
Department of Chemistry, National Tsing Hua University

Artificial light-harvesting systems capable of converting solar energy into a useful source of energy continue to attract much attention. Diverse organic, organometallic, and polymeric systems containing chromophore assemblies have been devised by various experimenters. The introduction of a flexible spacer such as  $\text{SiMe}_2$  between well defined chromophores in a mononuclear compound or a polymer chain has drawn much interest. Because it facilitates the intramolecular photoinduced charge transfer, this silicon-based tetrahedral spacer effectively interrupts the  $\pi$ -conjugation along the polymer backbone, which might enable tuning the color of emission by designing the chromophores with a varied length of conjugation.<sup>[1,2]</sup>

We studied the energy-transfer dynamics of a silylene-spaced alternating (donor- $\text{SiMe}_2$ -acceptor- $\text{SiMe}_2$ )<sub>*m*</sub> copolymer (abbreviated as (DA)<sub>*m*</sub>) via fluorescence up-conversion, and time-correlated single-photon counting. The donor is 4,4'-divinylbiphenyl, and the acceptor is 4,4'-divinylstilbene. The molecular formula of the (DA)<sub>*m*</sub> (*m*~30, molar mass~16300 g/mol) and its monomers **D** and **A** are shown in Scheme 1. We also employed theoretical calculations to obtain optimized geometries and transition dipole moments for the adjacent donor and acceptor, which are crucial parameters of the Förster model. We used the newly developed method – fragment excitation difference (FED) – to examine the interaction energy for monomer (DA)<sub>1</sub>, which allows us to characterize individually the contributions of Coulomb and exchange terms.

The absorption and fluorescence spectra of monomer donor **D** and acceptor **A** dissolved in *p*-dioxane are shown in Figure 1. Figure 2 shows the fluorescence decays at four characteristic wavelengths of (DA)<sub>*m*</sub> in THF. Upon excitation at 266 nm, the features of the time-resolved fluorescence vary significantly with emission wavelength. The fluorescence of the donor measured at 355 nm displays an instrument-limited rise followed by a rapid (0.3 ps) and a slow decay (5.6 ps). The intense fluorescence at 420 nm of the acceptor also shows an instrument-limited rise with a subsequent slow decay (4.9 ps). At 460 nm, the fluorescence from both acceptor and intramolecular aggregates displays a rapid rise (0.3 ps) followed by a slow decay (7.1 ps). The weak fluorescence at 500 nm, at which intramolecular aggregates emit predominantly, shows a rapid (0.3 ps) and a slow rise (4.4 ps).

The rate  $\sim(0.3 \text{ ps})^{-1}$  for energy transfer between the  $S_1$  states of the donor and acceptor moieties is assigned. Theoretical calculations based on fragment charge difference provide a rate of energy transfer near the experimental value with detailed insight into the mechanism of energy transfer. The results of theoretical calculations indicate that the Coulomb interaction is dominant and the Dexter process is weak. The high-multipole interactions are important for energy transfer in the case of (DA)<sub>*m*</sub>.



Scheme 1. Molecular structures of silylene-spaced copolymer (DA)<sub>m</sub>.

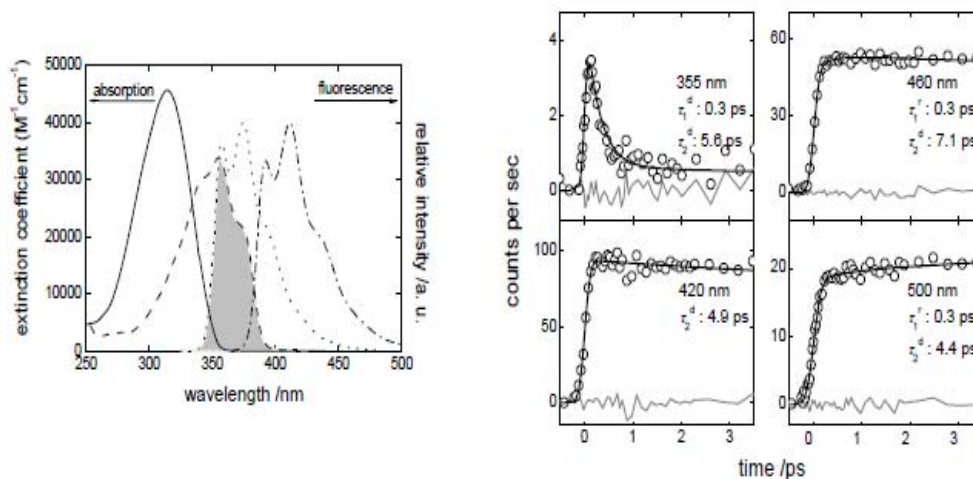


Figure 1. Absorption and fluorescence spectra of donor D (solid and dotted lines) and acceptor A (dashed and dashed-dotted lines) in *p*-dioxane with the region of spectral overlap indicated in gray.

Figure 2. Four time-resolved fluorescence decay curves of (DA)<sub>m</sub> in THF. The open circles and black solid curves are experimental data and the best-fitted curves, respectively; the residuals are shown in gray solid lines.

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**Intramolecular hydrogen bond effects on photostability of amino acid chromophores:  
photodissociation dynamics of hydroxybenzoic acid**

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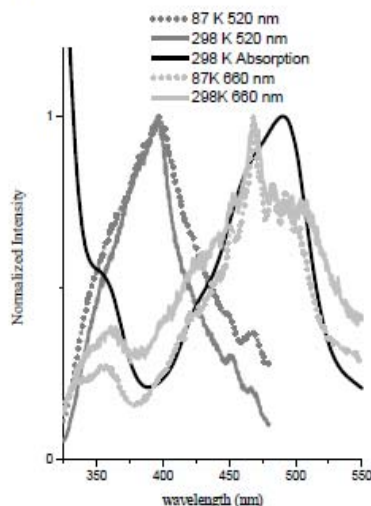
Theoretical prediction of hydrogen atom elimination on the excited state of phenol and confirmation by experimental observations have great impact on the explanation of the photostability of amino acid tyrosine irradiated by ultraviolet photons. In this work, we explored the photodissociation dynamics of the tyrosine chromophores, 2-, 3- and 4-hydroxybenzoic acid in a molecular beam at 193 nm using multimass ion imaging techniques. Dissociation channels of 3- and 4-hydroxybenzoic acids were found to be very similar to those for phenol. Hydrogen atom elimination from a repulsive excited state is the dominant channel for 3- and 4-hydroxybenzoic acid along with a small amount of OH elimination from 4-hydroxybenzoic acid. However, the major dissociation channels for 2-hydroxybenzoic acid are H<sub>2</sub>O elimination and three-body dissociation, C<sub>6</sub>H<sub>5</sub>OHCOOH → C<sub>6</sub>H<sub>5</sub>+H<sub>2</sub>O+CO<sub>2</sub>. Hydrogen atom elimination was barely observed. Ab initio calculations show that the potential energy surfaces are similar for phenol, the various conformers of 3- and 4-hydroxybenzoic acid, and the cofomers of 2-hydroxybenzoic acid without intramolecular hydrogen bonding. However, both the excited state and the ground state potential energy surfaces change significantly for the conformers of 2-hydroxybenzoic acid with intramolecular hydrogen bonding, suggesting that such bonding plays an important role in the photostability of tyrosine chromophores upon irradiation by ultraviolet photons.

# Dual-Emission of Low-Symmetry Ruthenium Complex

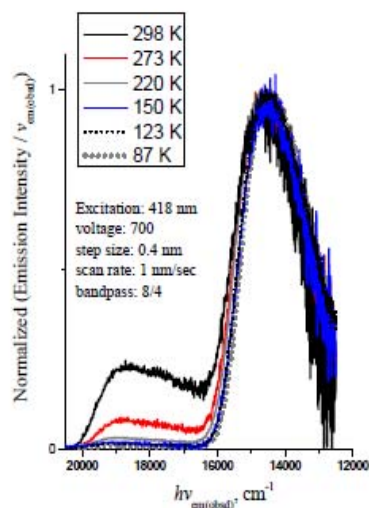
Yuan-Jang Chen (陳元璋)

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Excited-state relaxations of Ruthenium polypyridine complexes included the roles of efficient ligand-field state (LF state) and of long-lived metal-to-ligand state (MLCT state).<sup>1,4</sup> This is a report of the dual emission behavior of the  $[\text{Ru}(\text{bpy})(\text{tpy})(\text{CN})](\text{PF}_6)$  complex, where bpy = 2, 2'-bipyridine, tpy = 2, 2': 6', 2''-terpyridine. The broad metal-to-ligand charge-transfer absorption maximum occurs at 486 nm at 298 K in butyronitrile. The dual emission maxima occur at 530 nm and 660 nm, excitation energy at 418 nm, and the single emission maximum occurs at 660 nm, excitation energy at 496 nm, at 298 K in butyronitrile. The high energy emission band and low energy emission band of  $[\text{Ru}(\text{bpy})(\text{tpy})(\text{CN})](\text{PF}_6)$ , excitation at 365 nm, have short- and relatively long life time, respectively. The ratio of emission intensity between high energy band and low energy band,  $I_{\text{he}}/I_{\text{le}}$ , is decreased amplitudes with the temperature decreasing.



**Figure 1.** For  $[\text{Ru}(\text{bpy})(\text{tpy})(\text{CN})](\text{PF}_6)$  complex, the excitation spectra of high energy emission band (520 nm, gray curves) and of low energy emission band (660 nm, light curves) at 87 K (dot) and 298K (solid) comparing with absorption spectrum (black curve). Intensity maxima of excitation and absorption curves normalized to 1.



**Figure 2.** Emission spectra in butyronitrile at 298K of  $[\text{Ru}(\text{bpy})(\text{tpy})(\text{CN})]^+$ , the excitation energy at 418nm (black line) and 496nm (red line), respectively.

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## Extreme ultraviolet photochemistry of microlithography interests

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Extreme ultraviolet (EUV) lithography at 13.5 nm is the most likely candidate to enable IC manufacturing down to the 16 nm technology node and beyond. Photoresists and related materials respond differently to the 13.5 nm light than to wavelengths in the UV and VUV regions typically of photochemical interests. Resist outgassing is a unique issue to EUV applications; it has been identified to result in EUV optics contamination, which will hinder the technology into a high-volume manufacturing mode. Supported by the National Science Council and industrial companies, we qualitatively and quantitatively characterized neutral and ionic outgassing from photoresist and underlayer materials upon irradiation at 13.5 nm. We identified detrimental  $F^+$ ,  $C_xF_y^+$ , and ions of high molecular masses, which have not been observed in neutral outgassing studies. The amounts of outgassing were successfully correlated to EUV photoabsorption and structural properties (double bond equivalent per carbon) of these materials. According to the results, we proposed plausible reaction mechanisms of EUV photochemistry leading to outgassing.

**Keywords:** Extreme ultraviolet (EUV) lithography; 13.5 nm; outgassing; photoresist; underlayer material; photochemistry.

## Three-dimensional sliced fluorescence imaging in bulbs

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To study dynamic behaviors of molecular photodissociation processes, and photo-initiated inelastic and reactive collisions in a bulb environment, a three-dimensional sliced fluorescence imaging method has been developed. This experimental method combines the sliced fluorescence imaging techniques and a double resonance spectroscopic detection scheme to acquire the central slice of state-selected Newton spheres of scattering products. For example, inelastic collisions of the pumped intermediate state in the double resonance detection scheme provide an access to determine their state-to-state differential cross sections from the sliced images of collision-populated states. To illustrate the essence and simplicity of the present method, experimental images of state-selected CN photofragments from the ICN photodissociation are presented.

## **Extraction of dynamic information from three-dimensional sliced fluorescence images in a bulb environment**

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*Department of Chemistry, National Sun Yat-sen University, Kaohsiung 804,  
Taiwan, Republic of China*

The three-dimensional (3D) sliced fluorescence imaging method which combines sliced fluorescence imaging techniques and a double resonance spectroscopic detection scheme provides an access to extract dynamic information of molecular photodissociation processes, and photo-initiated inelastic and reactive collisions in a bulb environment. An analytical framework has been established to determine state-to-state differential cross sections of rotational energy transfer processes in bulbs. Legendre moment analyses of the experimental images of collision-populated states disclose their collision dynamics under a highly thermal-averaged condition. For molecular photodissociation processes, the alignment parameter in the recoil frame can be determined from the Legendre moment analyses of a single 3D sliced fluorescence image of photofragments, provided that the transition to the intermediate state in the double resonance excitation route is saturated.

## 國科會化學推動中心補助學術研討會成果報告表

會議名稱：2010 年台灣質譜學會第七屆學術研討會
舉辦日期：民國 99 年 6 月 27 日 至 民國 99 年 6 月 29 日
主辦機構：高雄醫學大學 主持人：黃友利 田育彰
舉辦地點：高雄醫學大學 聯絡電話：07-3121101-2357-20
出席人數：工業界 <u>80</u> 人、學術界(含學生) <u>430</u> 人 共 <u>510</u> 人

會議重要成果：(如篇幅不足,另以 A4 白紙填寫)

### 1. 會議經過及議程

會議自 6/27 至 6/29 共三天，議程如後。

### 2. 國外講員其他演講行程

學會特別演講邀請 3 位貴賓演講

6 月 27 日 16:00~17:00 楊末雄教授介紹「分析化學的發展與 ICP-MS 的原理與應用」。

6 月 28 日 10:00~11:00 中央研究院翁啟惠院長演講「Post-translational Glycosylation: Challenges and Opportunities」。

6 月 28 日 11:10~12:00 約翰霍普金斯大學李遠川院士演講「The MSs in My Life: A Reflection」。

### 3. 重要收穫及心得

此次研討會共有三天的時間，6 月 27 日下午由楊末雄老師演講開始揭開序幕，楊老師講題為「分析化學的發展與 ICP-MS 的原理與應用」介紹 ICP-MS 的演進及發展過程，6 月 28 日則由中央研究院翁啟惠院長及李遠川院士分別擔任本次年會的大會邀請演講人，翁院長的演講題目為「Post-translational Glycosylation: Challenges and Opportunities」，李院士的演講題目則為「The MSs in My Life: A Reflection」，感謝這些前輩、教授不吝於分享他們的成果這幾場的演講，不僅僅使聽講人數爆滿，演講會後更有不少人覺得有種如沐春風的感覺。

今年度的學術研討會主題為「質譜基礎理論及其應用」，與會的人士皆是在質譜領域

有貢獻發展的人才，無論是特別演講或是口頭報告，都使與會者見識到質譜技術在各方面寬廣的應用，在生物分析、藥品檢測甚至於前年引起喧然大波的三聚氰胺檢測，再再顯示出質譜技術在現今社會的多元發展。今年的研討會比往年熱絡盛大，邀請演講有 16 位學者，口頭報告 32 位，壁報展示則達 140 篇，另外還有 4 場的 Workshop，主題分別為食品安全之微量分析與快速篩檢、應用於質譜數據比對之分析軟體、從生物標記的發現到驗證-MRM 定量模式、毒品與濫用藥物之尿液分析。從台灣各地匯整而來的研究成果的確使人大開眼界，尤其是國家級研究單位如中研院、核研所等地的研究單位所張貼的壁報不勝其數，在這次活動中透過專家學者的討論，更激發出更多來自工業界及學界的質譜研究的交流。

此外這次參加儀器展的廠商多達 19 家，在最後一天科儀新知時，各家廠商介紹自家儀器及技術，使人感覺到未來質譜蓬勃發展的可能，雖然每位廠商極力推薦自家的儀器的優點讓人感到有點不實際，但是卻使人對未來的技術及儀器有著相當大的信心，相信在不久後能聽到質譜相關的應用上有令人振奮的消息。

這幾天研討會的人數、參展廠商參加的踴躍，使與會人員能與研究先進有充分的交流，有人說在學問面前，任何人都是渺小的，在閉幕式時，理事長提到每年參加美國質譜年會，都看到 Virginia Commonwealth 大學的 John B. Fenn 教授（2002 年諾貝爾化學獎得主）以高齡的年紀仍是不缺席，這樣的精神又讓我們有何藉口怠惰。這次的學會大師林立，參與的人，皆抱持著學習的態度，令人感覺到研究的路十分漫長，除了以謙卑的心時時接受新知，未來多參加研討學會，對研究工作更有助益。

#### 4. 建議

這次為期了兩天半的質譜學會，受益良多，希望未來學會可延長舉辦天數，不僅可以更加深入研究、彼此交流切磋，更能促進質譜科技的蓬勃發展。希望國家能給予這類大型學會更多的補助，讓學會能更順利舉行。這次動用到很多的工作人員，工作人員雖然都很辛苦但仍親切地對待每一位參與的人，非常感謝。學會總是於適當的時間和地點提供非常可口美味的餐點與飲料，讓人覺得非常貼心，於緊湊的行程中，仍可適時給予休息，讓人可精力充沛地參與完成這兩天半的行程。這次提供的贈品也很豐富，在南部舉辦研討會雖然天氣炎熱，但感謝高雄醫學大學提供空調的場地，使與會者能在舒適的會議室內聆聽演講。這次會場皆有清楚的旗幟與告示指標，令人清楚的知道各個活動會場地點，此外這個大會亦有許多辛勤的工作人員，不管是一開始報到、會場地點指引、及發送餐...等。因為有他們的協助可以使活動更順利進行，希望未來國家針對大型年會的補助可以多一些。

## The Splendid time in Taiwan

I stayed in Taiwan for one week as a visiting lecturer of the Chemistry Research Promotion Center, NSC. Prof. Tashin Chow of Academia Sinica kindly arranged my schedule, and I had significant and splendid time during my stay.

I visited to National Taiwan University (Local host: Prof. Man-kit Leung), National Chiao Tung University (Prof. Wen-Sheng Chung) and Academia Sinica (Prof. Chow), and discussed with many distinguished researchers and talented young chemists. I also deliver a lecture entitled “Organic Syntheses Using Electrochemically Generated Highly Reactive Species” in each place. I hope my lecture would give a little traction for the researches. Different people have different customs. As the proverb goes, I have got many interesting experiences. All Taiwanese professor are running their own laboratory by themselves like United State. Although I knew the situation, I did not know many Taiwanese chemists are interested in the Japanese academic system. We have a research group which often consists of a full professor, an associate professor, and an assistant professor. Even in Japan there are still huge discussions about the complex issue; however, I believed that all Taiwanese chemists are enjoying such an independent system. Contrary to my expectation, many researchers have an idea that the Japanese system seems to be more suitable for Taiwanese academics, especially young professors. There are many difficult issues, and it is not easy to get an answer, it was a slight surprise for me. Personally I really agree that the following of US system should not be only solution, and the small countries without resources such as Taiwan and Japan may have our own system which makes academics more creative and innovative.

Different countries have different foods. I also have an impressive aliment culture. I really enjoyed Taiwanese foods. The night market, to where the postdoctoral fellows of Prof. Chow, Drs. Jay Chang, and Watanabe, took me, was so exciting and enjoyable. My most favorite is fried kong-xin-cai (空心菜). I was also surprised that kong-xin-cai is so cheap in Taiwan. When I was a graduate student, I had a Chinese classmate. He always said the fried kong-xin-cai was very nice. It was and it is still now quite difficult to find kong-xin-cai in Japanese supermarket, although the reason is no clear. As a last resort, I decided to cultivate kong-xin-cai in my garden of my house!

Finally, I really appreciate all the host researchers and new friends in Taiwan for their kind help and fruitful discussions. I look forward to seeing all of you in near future.

Division of Chemistry and Biochemistry  
Graduate School of Natural Science and Technology  
Okayama University (岡山大学)  
Seiji Suga



# 訪問教授訪問報告

姓名：Dr. Richard Tilley

訪問日期：民國 99 年 4 月 10 日 至 民國 99 年 4 月 17 日

接待機構：成功大學化學系 接待人：葉晨聖 教授 聯絡電話：06-2741618

訪問重要成果：（如篇幅不足,另以A4 白紙填寫）

## 1. 訪問經過

Dr Richard Tilley 目前為 Victoria University of Wellington 的 Senior Lecturer，在半導體量子點，如矽,鍺的合成，以及具有催化性質的鉑和鈀奈米粒的合成與鑑定上有豐富的成果，因此特邀請之來台參訪交流與演講。在本次參訪過程中，特別感謝清華大學何佳安教授及中興大學廖民淵教授協助接待與安排行程。Dr Richard Tilley 在這次參訪中，除了與成功大學化學所奈米探索實驗室有充分的交流外，並與成功大學化工系和醫學院教授交換在奈米材料的研究心得，對於成功大學，清華大學以及中興大學化學系的研究領域也有進一步的認識，另外也表示對於建立雙方合作關係有高度的興趣。

## 2. 演講行程及概要

April 11<sup>th</sup> 抵達台灣

April 12<sup>th</sup> 拜訪成功大學化學系葉晨聖教授以及奈米探索實驗室

拜訪成功大學化工系陳東煌教授與吳季珍教授

拜訪成功大學醫學院謝達斌教授

April 13<sup>th</sup> 台南市古蹟巡禮

與成大化學系教授參敘

成大化學系演講

Lecture title: Liquid phase Synthesis and Applications of Nanoparticles

April 14<sup>th</sup> 拜訪清華大學化工系段興宇教授

拜訪清華大學化學系何佳安教授，黃暄益教授，陳益佳教授

以及黃國柱教授。

清華大學化學系演講

Lecture title: Liquid phase Synthesis and Applications of Nanoparticles



參觀新竹城隍廟

與清華大學化學系教授餐敘

April 15<sup>th</sup> 拜訪中興大學化學系  
中興大學化學系演講  
遊覽日月潭

April 16<sup>th</sup> 台北一日遊

April 17<sup>th</sup> Flight back to New Zealand

### 3.重要收獲及心得

Dr Richard Tilley 專長於半導體矽,鍺量子點及具有催化性質的鉑和鈀奈米粒子的研究,在奈米材料的成長機制有獨到的見解。由於矽量子點以及穩定的小尺寸鉑和鈀奈米粒子在合成與純化上有相當的困難度,藉由此次參訪,Dr. Richard Tilley 的經驗可提供國內在無機奈米粒子的相關學者有進一步的交流並拓展可能的合作機會。

### 4.其他意見

無。

## 訪問教授訪問報告表

姓名：Jennifer Field

訪問日期：民國 99 年 4 月 26 日 至 民國 99 年 5 月 2 日

接待機構：中央大學化學系 接待人：丁望賢 聯絡電話：03-4227151 ext 65905

訪問重要成果：(如篇幅不足,另以A4 白紙填寫)

### 1. 訪問經過

Field 教授於4/26日抵達台灣。她此次的參訪行程共提供三場演講，於4/27日在台灣大學環境工程研究所進行第一場演講，並提供一Special Workshop “How to publish paper in ES&T”。於4/29日在環境檢驗所進行第二場演講，並與中央化學系環境檢測研究團隊有深入的經驗交流。於4/30日參加「2010年台灣環境分析研討會」，進行第三場演講(Keynote Lecture)。於5/2日搭機離開台灣。整個行程有台灣大學環境工程研究所林郁真教授協助接待與安排。

### 2. 演講行程及概要

4/26: Arrive at Taipei

4/27: Visit Graduate Institute of Environmental Engineering, National Taiwan University.

**Lecture title:** Illicit Drugs and Biomarkers in Raw Wastewater: a New Tool for Drug Epidemiology

**Special Workshop:** How to publish paper in ES&T.

4/28: Sightseeing Taipei (National Palace Museum, Taipei 101, etc).

4/29: Visit Taiwan-EPA Environmental Analysis Laboratory, Chung-Li

**Lecture title:** Illicit Drugs and Biomarkers in Raw Wastewater: Large-Volume Direct Injection Method.

4/30: Attend “2010 Taiwan Conference on Environmental Analytical Chemistry” at Taichung.

**Keynote Lecture title:** Large-Volume Direct Injection- Revolutionizing Sample Preparation and LC/MS/MS Analysis of Polar Organic Pollutants

5/2: Back to the USA.

### 3. 重要收穫及心得

Field 教授在奈米材料與新興污染物於環境生態中的檢測方法開發及其在環境中殘留、流布及對健康影響之研究有豐富經驗。Field 教授平易近人，使會面的教授、環境檢驗所同仁與學生都能以輕鬆的方式與她討論相關之研究議題，加上她精彩詳實的演講內容，前往聆聽的教授與學生們都獲益良多。此次特別邀請她來台參加「2010年台灣環境分析研討會」，並為大會演講者(Keynote speaker)。於此期間她分別與台灣大學環境工程研究所學生及環境檢驗所同仁有廣泛的交流，在環境檢驗所參觀時提供寶貴的新興污染物檢測方法開發與應用的實際經驗。與中央化學系環境檢測研究團隊也有深入的經驗交換，對未來雙方的合作建立良好的開始。

### 4. 其他意見

特別感謝國科會經費支助，台灣環境分析學會凌永健理事長、中央化學系王家麟主任、靜宜應化系王書蘋主任與蔡素珍教授的熱情接待。

## 訪問教授訪問報告表

姓名：陳春英 教授
訪問日期：民國 99 年 5 月 6 日 至 民國 99 年 5 月 12 日
接待機構：台灣大學化學研究所 接待人：劉如熹教授 聯絡電話：02-33661170
<u>訪問重要成果：</u> (一) 訪問演講或技術指導等經過及內容摘要 1. 訪問經過 邀請北京國家科學奈米中心陳春英教授至台，藉由演講訪問交流奈米材料於生醫領域之發展與安全評估，其訪問經過如下： 5/6 (星期四) 抵達台灣桃園機場。 5/7 (星期五) 於台灣大學化學系演講與討論。 5/8 (星期六) 參觀故宮與台北 101。 5/9 (星期日) 參觀淡水。 5/10 (星期一) 於清華大學化學研究所演講與討論。(接待人：凌永健教授) 5/11 (星期二) 於中研院基因體中心演講與討論。(接待人：陳仲瑄主任) 5/12 (星期三) 離台。 2. 演講行程及概要 5/7 下午 5 點於台灣大學化學研究所演講，題目為 The influence of physicochemical characteristics of nanoscale materials on cellular uptake, cytotoxicity and their potential for cancer therapy。其演講內容主要說明利用修飾後奈米材料於 A549 細胞之治療以及其細胞吞噬之機制。(摘要如附件一) 5/10 下午 2 點於清華大學化學研究所演講，題目為 Understanding the Janus Faces of Nanoparticle-Based Drug Delivery and Medicine: Benefit and Limitation。其演講內容主要說明了解奈米材料於藥物治療其益處與限制。(摘要如附件二) 5/11 下午 3 點於中央研究院基因體中心演講，題目為 The influence of Physicochemical characteristics of nanoscale materials on cellular uptake, cytotoxicity and their potential for cancer therapy。其演講內容主要說明利用新穎之 $Gd@C_{82}(OH)_x$ 奈米材料於治療癌細胞之發展與前瞻性。(摘要如附件三) (二) 檢討及建議 陳春英研究員為現今於奈米生物安全領域具權威與豐富經驗之專家，其研究對各種奈米粒子於生物體外之探討精闢與發展具前瞻性抗癌細胞之奈米材料。本次邀請其訪台，藉以演講及討論方式以達學術交流之目的。 陳春英研究員於訪台時間與各學術單位交流並演講，提出許多新穎與具前瞻性之研究內容。5/7 於台灣大學化學系演講，報告內容展現其於奈米材料安全性之探討之專業性，藉由吸入或攝入之方式使奈米材料進入老鼠體內，並藉由染色追蹤其奈米材料於各種器官細胞之分布情況，深入細胞內之胞器討論，進一步了解其奈米顆粒對於細胞

之影響，最後提出一系列之機制探討。5/10 於清華大學化學系陳述其奈米材料修飾藥物之傳遞現象與其治療之效果，並且明確點出其奈米材料之應用優點，且進一步探討其於生物應用之限制性，未來希望能夠更進一步之提高奈米材料之醫學應用性，其展現出相當具潛力之研究。5/11 於中研院基因體中心報告其於抗癌藥物之合成與應用，藉由  $C_{82}(OH)_x$  包裹 Gd 形成  $Gd@C_{82}(OH)_x$  之結構，其具相當特殊之抗癌特性，而對於細胞選擇性展現相當新穎之特異性，其結果指出其可能應用為新種抗癌藥物，因此其應用性相當突出且獨特，因此其極具非常前端之展望。

5/7 台灣大學化學研究所演講之留影。



5/10 清華大學化學研究所演講之留影。



5/11 中央研究院基因體中心演講之留影。



**The influence of physicochemical characteristics of nanoscale materials on cellular uptake, cytotoxicity and their potential for cancer therapy**

Chunying Chen

Key Lab for Biological Effects of Nanomaterials and Nanosafety of CAS,  
National Center for Nanosciences and Technology of China, Beijing, China.

Nanomedicine has been progressing rapidly in recent years accompanying with the tremendous advances on the capacity to manipulate different size, shape, and physicochemical properties of nanoscale systems with varied composition; however, the safety of nanomaterials is still one of the major stumbling blocks in further progressing of nanomedicine. Few definite trends of awareness have been established so far, largely due to the lack of an effective paradigm for comprehensively evaluating related factors, like the composition, size, architecture, surface charge of the nanoparticles, the density, thickness and stability of the surface coating under physiological conditions and so forth

In this talk, I will focus on the water-soluble Fullerene (C<sub>60</sub>) derivatives and gold nanomaterials. Gold nanorods (Au NRs) are promising nanomaterials for applications in biomedicine due to their unique physiochemical and optical properties, like sensing, imaging, delivery and therapy, but the toxicology issues are still controversial, especially for the GNRs synthesized with seed mediated method. In this research, we investigated the influence of aspect ratio and surface coating on the toxicity and cellular uptake. Since its discovery, fullerene (C<sub>60</sub>) has attracted an increasing interest in many fields including material chemistry and biomedicine. The spherical C<sub>60</sub> molecule has 30 double bonds and is easily modified with chemical groups with particular desired functions. The synthesis and chemical modification of water-soluble C<sub>60</sub> derivatives opens up broad opportunities for their pharmaceutical applications. The addition of different types of hydrophilic groups, such as amino acids, carboxylic acids, and polyhydroxyl groups can reduce their cytotoxicity and increase their potential application in cancer therapy.

## **Understanding the Janus Faces of Nanoparticle-Based Drug Delivery and Medicine: Benefit and Limitation**

**Chunying Chen**

CAS Key Laboratory for Biological Effects of Nanomaterials and Nanosafety, National Center for Nanoscience and Technology & Institute of High Energy Physics, Chinese Academy of Sciences, Beijing 100190, PR China. Tel: +86-10-82545560, Fax: +86-10-62656765.  
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Cancer is a leading cause of death worldwide. Metastasis, the spread and growth of tumors at secondary sites, is an extremely significant clinical event and is responsible for the majority of cancer mortalities rather than the primary tumor itself. Recent advances in nanotechnology have shown great potential for cancer therapy and clinical applications. Nanomaterials, with their unique size-dependent physical and chemical properties, have showed promising advantages as drug and gene delivery vehicles, ultra-sensitive intracellular detectors and novel therapeutic drugs. However, along with these promising progresses, the toxicological impact of engineered nanomaterials exists as a potential risk and has caught much attention. Interactions of pharmaceutical nanomaterials with biological environment, stability, bio-distribution and target tissue depend on nanoparticle characteristics, such as the composition, size, shape, porosity, density, surface characteristics of nanomaterials. Therefore, designing nanoparticle-based drug delivery and nanomedicine without significant toxicity for clinical application has become an important issue.

In this presentation, I will also introduce the recent progresses on the proper chemical modification on the fullerene surface that yields nanoparticles with novel antitumor effects and biologically useful antioxidant activity. The cellular uptake of fullerene nanoparticles was found to be clathrin-mediated but not caveolae-mediated mainly via endocytosis with time-, temperature- and energy-dependent manners. The endocytosis mechanism and the subcellular target location provide key information for better understanding and predicting the biomedical and toxicological effects of fullerene nanoparticles inside cells. The addition of different types of hydrophilic groups, such as amino acids, carboxylic acids, and polyhydroxyl groups can reduce their cytotoxicity and increase their potential application in cancer therapy.

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Nanomedicine has been progressing rapidly in recent years accompanying with the tremendous advances on the capacity to manipulate different size, shape, and physicochemical properties of nanoscale systems with varied composition; however, the safety of nanomaterials is still one of the major stumbling blocks in further progressing of nanomedicine. Few definite trends of awareness have been established so far, largely due to the lack of an effective paradigm for comprehensively evaluating related factors, like the composition, size, architecture, surface charge of the nanoparticles, the density, thickness and stability of the surface coating under physiological conditions and so forth

In this talk, I will focus on the water-soluble Fullerene (C60) derivatives and gold nanomaterials. Gold nanorods (Au NRs) are promising nanomaterials for applications in biomedicine due to their unique physiochemical and optical properties, like sensing, imaging, delivery and therapy, but the toxicology issues are still controversial, especially for the GNRs synthesized with seed mediated method. In this research, we investigated the influence of aspect ratio and surface coating on the toxicity and cellular uptake. Since its discovery, fullerene (C60) has attracted an increasing interest in many fields including material chemistry and biomedicine. The spherical C60 molecule has 30 double bonds and is easily modified with chemical groups with particular desired functions. The synthesis and chemical modification of water-soluble C60 derivatives opens up broad opportunities for their pharmaceutical applications. The addition of different types of hydrophilic groups, such as amino acids, carboxylic acids, and polyhydroxyl groups can reduce their cytotoxicity and increase their potential application in cancer therapy.

## 訪問教授訪問報告表

姓名：張洪杰 教授
訪問日期：民國 99 年 5 月 23 日 至 民國 99 年 5 月 29 日
接待機構：台灣大學化學系      接待人：劉如熹教授      聯絡電話：02-33661169
<u>訪問重要成果：</u> (一) 訪問演講或技術指導等經過及內容摘要  1. 訪問經過 邀請長春應化所副所長張洪杰(Hongjie Zhang)教授至台，藉由演講訪問交流關於發光性稀土材料之基礎性研究與應用之重要性，其訪問經過如下： 5/23 抵達台灣桃園機場。 5/24 參觀故宮與台北 101。 5/25 於清華大學化學系演講與討論。(王素蘭教授接待) 5/26 參觀野柳及九份。 5/27 於中央研究院化學所演講與討論。(陶雨臺所長接待) 5/28 於台灣大學化學系演講與討論。 5/29 離台。  2. 演講行程及概要 5/25 下午 2 點於清華大學化學研究所演講，題目為稀土有機/無機雜化材料的製備及性能研究。其演講內容主要說明藉由共價鍵嫁接與原位合成之方式促使稀土材料之摻染濃度程度大幅提高，而加強其應用性前瞻性。 5/27 上午 10 點半於中央研究院化學所演講，題目為稀土有機/無機雜化材料的製備及性能研究。其演講內容主要說明藉由提高配位基之修飾而加強稀土材料之摻雜，因而能拓展至各種基材上之應用。 5/28 下午 3 點半於台灣大學化學系演講，題目為新型功能納米材料的構築及性能研究。其演講內容主要說明藉由稀土金屬之修飾生物相容性材料而賦予多功能化以提高於生物領域之發展應用。  (二) 檢討及建議 張洪杰教授為現今於發光性之稀土有機/無機雜化材料領域之頂尖專家，其於稀土發光之研究方面著重於雜化材料之發展，其拓展單一材料之功能而轉為多功能導向之材料，加強其發展性。本次邀請其訪台，藉以演講及討論方式以達學術交流之目的。張洪杰教授於訪台時間與各學術單位交流並演講，提出許多功能化新穎之雜化材料與具前瞻性之應用研究。5/25 於清華大學化學研究所演講，報告內容提出藉由共價鍵嫁接與原位合成之方式使有機無/機材料之摻染濃度提高，其具分散均勻度高、穩定性佳與發光效率高之性質。因此突破以傳統方式摻雜之極限，不僅提高稀土摻雜含量且提高其穩定度，進一步提高此材料之發光強度，大幅提升此材料之應用性，其具相當大



之應用前瞻性。5/27 於中央研究院化學所演講，陳述其藉由 8-羥基喹啉(HQ)之配位基成功結合稀土金屬，進一步提高其嫁接能力，因此可任意嫁接於任何基材上，如二氧化矽等，因此成功製備雙功能烷氧基功能化的配體等，修飾後材料具相當之發展潛力，不僅於二氧化矽之材料摻雜，更可藉由此模型而任意應用於許多材料上，因而發揮其相當大之應用前景。5/28 於台灣大學化學研究所報告，展現其藉由發光稀土材料修飾之磁性之四氧化三鐵材料，並結合二氧化矽，以提高其材料應用於生物之相容性，不僅推廣材料之應用前景，更向生物物領域提供一相當新穎獨特之材料，又因其具強烈之發光性質與可調性，而提供一生物應用導向，此其極具非常前端之展望。

5/25 清華大學化學研究所演講之留影。



5/27 中央研究院化學所之留影。



5/28 台灣大學化學研究所演講之留影。



## 訪問教授訪問報告表

姓名：Julius Rebek
訪問日期：民國 99 年 6 月 29 日 至 民國 99 年 7 月 4 日
接待機構：國立東華大學 接待人：戴達夫 聯絡電話：03-8633579
<u>訪問重要成果</u> ：（如篇幅不足,另以A4 白紙填寫）
1. 訪問經過
Rebek 教授於 6/29 搭乘華航 005 由美國洛杉磯抵達桃園中正機場，夜宿新竹，次日即於交通大學演講，由孫仲銘與鍾文聖教授接待與晚宴，第三天參觀故宮並由劉緒宗、楊吉水教授安排在台大演講，星期五坐太魯閣號到東華大學演講與林志彪院長等晚宴，星期參觀太魯閣國家公園，7/4 搭機赴日本大阪參加另一項國際會議。
2. 演講行程及概要
6/30 Wednesday 3 pm: Give a lecture at National Chiao Tung University, Hsinchu <b>“Recognition and Catalysis in Deep Cavities”</b>
7/1 Thursday 3 pm: Give a lecture at National Taiwan University, Taipei <b>“The Inner Space of Molecules”</b>
7/2 Friday 3 pm: Give a lecture at National Dong Hwa University, Hualien <b>“Molecular Assembly and Encapsulation”</b>
3. 重要收穫及心得
Rebek 教授為美國國家院士，於化學生物學領域研究有成，分子自組裝為 capsule 來包容化合物為首創獨到的成果，不但能形成主客，具深度之巨環化物能藉由官能基形成辨識工具及催化劑。目前更進展到動力學的觀測組裝及填滿空間的過程，顯示出能控制內部新穎的立體位向及反應性，成為特殊的分子工具。其三場演講均饒富深意，使人回味省思。
4. 其他意見
Rebek 教授應邀請，並投回顧論文予 JCCS，化學會應該優先刊登邀請之論文。此外回程赴日演講，因此僅單程機票核銷，國科會是否也應優惠補貼些旅費之差額。

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June 30, 2010

Director,  
Chemistry Research Promotion Center,  
National Science Council  
P. O. Box 23-202, Taipei,  
Taiwan 106, Republic of China

**A report on visits to the Institute of Atomic and Molecular Sciences (IAMS), the Academia Sinica, the National Central University (NCU), the Industrial Technology Research Institute (ITRI), and the National Sun Yat-Sen University (NSYSU), per an invitation from the Chemistry Research Promotion Center, National Science Council of Taiwan, during June 9-15, 2010.**

Professor Shang-Bin Liu, Institute of Atomic and Molecular Sciences (IAMS), Academia Sinica, arranged my visit to the above institutes in the interest of promoting mutual understanding between Taiwanese and Korean researchers in the sciences. I visited IAMS, NCU, ITRI, and NSYSU from June 9<sup>th</sup> through the 15<sup>th</sup>, presenting three formal seminars and two informal seminars on my recent research topics.

**1. Visit to National Central University and Industrial Technology Research Institute:**

On June 10<sup>th</sup>, I visited the NCU at Chungli and presented an informal seminar, titled "Solid-state NMR Investigation of Alcohol Behavior in Direct Alcohol Fuel Cells," for the students of Professor Peter Po-Jen Chu, who himself posed a number of questions regarding the various NMR techniques for studying these fuel cells.

Unfortunately, due to time constraints he was unable to provide an in-depth explanation of his research group's accomplishments and plans. However, he did inform me his most significant subject has been polymer electrolyte membranes mentioning that he had been a visiting scholar in Professor Spiess's laboratory, at the Max Planck Institute for Polymer Research in Germany, and has collaborated with Spiess since then.

After lunch, he accompanied me to ITRI and introduced me to Dr. Jiunn-Nan Lin, my host at ITRI. I presented the formal seminar, likewise titled "Solid-state NMR Investigation of Alcohol Behavior in Direct Alcohol Fuel Cells," to a lecture hall filled by over forty researchers. We enjoyed a long question-and-answer session after the presentation. Dr. Lin showed me the laboratories for testing fuel cell performance and characterizing fuel cell materials. Dr. Li-Duan Tsai was introduced to me during this laboratory tour. Drs. Tsai and Lin, Professor Chu, and I engaged in an in-depth discussion of fuel cell R&D; indeed, since Dr. Tsai had been unable to attend my seminar, I effectively presented an informal, personal seminar for her. In return, she showed me ITRI's direct alcohol fuel cells, developed for mobile electronic devices. I was quite impressed to view the pilot products' high quality and to learn of ITRI's successful, close working relationship with certain Taiwanese small industries having well-selected and -focused R&D subjects. I surmise the Taiwanese government is behind this entire working system, which is an excellent example for study. I am particularly grateful for my discussion with the researchers at ITRI and with Professor Chu, and for the hospitality of professors Lin and Chu.

## **2. Visit to the Department of Chemistry, National Sun Yat-Sen University:**

On June 10, after my official visit to ITRI, Professor Shang-Bin Liu accompanied my travel from Hsingchu to Kaohsiung, where Professor Shangwu Ding was kind enough to be my host at the NSYSU. I was scheduled to talk on "Direct Alcohol Fuel Cells Studied by Solid-state NMR Spectroscopy," on June 11. Before the seminar at 2 p.m., Professor Ding arranged a luncheon meeting for Professor Liu, me, and three more professors in the department of chemistry, including Professors Kuo-mei Chen and Shuchen Hsieh. On the way to the seminar room, I spent a few moments viewing the venerable small house where the first president of Taiwan, 蔣介石, had lived. I had interesting discussions with Professor Ding and his students on using NMR to study fuel

cell-related materials characterization, not only in the seminar room but also in Professor Ding's laboratory visited afterward.

### **3. Visit to the Institute of Atomic and Molecular Sciences, Academia Sinica**

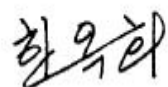
I visited the IAMS and the National Taiwan University in Taipei on June 14<sup>th</sup> and presented a seminar on "Solid-state NMR Investigation on Chemical Structures and Dynamics of Functional Nanomaterials." I had interesting discussions with Professor Soofin Cheng at the Department of Chemistry, National Taiwan University and Professor Tien-Sung Tom Lin, of Washington University in St. Louis. After my presentation, I took the opportunity to speak with Professor Liu about his various research areas, such as mesoporous carbon, CO<sub>2</sub> capturing materials, acidity measuring methods, and silylation of MCM-41 probed with hyperpolarized (HP) <sup>129</sup>Xe NMR. I was particularly impressed by his work in acidity work HP <sup>129</sup>Xe NMR. In fact, during this visit HP <sup>129</sup>Xe NMR was used to characterize three out of the six mesoporous silica samples I brought to him. He already confirmed that the hydrothermally treated sample has larger pores than it had before the treatment, and the surface-modified sample showed little difference from the same sample before this surface functionalization. Such collaboration, not only between synthesis and characterization laboratories, but also among NMR laboratories with different specialties, is mutually beneficial and may, potentially, advance science and technology. We also agreed that these collaboration results urgently demand publication in an academic journal in the near future. In addition to the scientific discussion, Liu and I discussed such far-ranging subjects as culture, religion, and scientific collaboration between China and Taiwan. In particular, I was impressed by the scientific collaboration between China and Taiwan, which received support from the Taiwanese government.

During this visit to Taiwan, I presented three formal seminars and had beneficial, interesting discussions on NMR techniques for fuel cell analysis and NMR characterization of functional nanomaterials with many researchers, professors, and students. I cherish the memory of my excellent Taiwanese colleagues and their students, as well as of my cultural experience during the visit. Certainly, I wish to continue improving mutual understanding, friendships, and research collaborations with my

colleagues in Taiwan, especially with Professor Liu.

I wish to take this chance to thank the Chemistry Research Promotion Center, National Science Council for its financial support of my visit and to thank Professor Liu for providing me this wonderful opportunity to develop collaboration and friendship.

Sincerely,

Handwritten signature in Korean characters, reading '한옥희' (Han Ok-hee).

---

Oc Hee Han Ph. D.  
Principal Researcher

## 訪問教授訪問報告表

姓名：Donald J. Darensbourg
訪問日期：民國 99 年 5 月 5 日 至 民國 99 年 5 月 9 日
接待機構：國立台灣師大化學系 接待人：李位仁教授 聯絡電話：(02)7734-6133
訪問重要成果：（如篇幅不足,另以A4 白紙填寫）
1. 訪問經過 <p>Darensbourg 教授在 5 月 5 日〔星期三〕晚上 8 時 45 分抵達桃園中正國際機場，由國立台灣師範大學李位仁 教授陪同下隨即驅車前往台北下榻福華飯店，隔日 5 月 6 日〔星期四〕於下午 2 點鐘前往國立台灣師大化學系訪問並進行第一場演講。5 月 7 日〔星期五〕參觀 101 大樓並與國立台灣師大化學系的學生座談。5 月 8 日〔星期六〕於國立清華大學化學系參與”2010 年台灣生物無機研討會”。並於上午 10 時 20 分進行第二場演講。隔日 5 月 9 日〔星期日〕搭機前往新加坡演講。</p>
2. 演講行程及概要 <p>5 月 6 日〔星期四〕下午 2 點鐘於國立台灣師大化學系進行第一場演講，演講題目是” Making Plastics from Carbon Dioxide. Carbon Dioxide – A Waste or a Raw Material”。Darensbourg 教授在他的演講中介紹如何使用二氧化碳與氧化環己烷來製造生物可裂解共聚合物，不僅提供一個降低全球暖化的可行方法，也為環境綠化找到一條出路。5 月 8 日〔星期六〕上午 10 時 20 分於清華大學化學系進行第二場演講，演講題目是” Copolymerization Reactions of Carbon Dioxide and Cyclic Ethers—The Intermediacy of Cyclic Carbonates”。在 Darensbourg 教授的第二場演講，他提到另一種生物可裂解共聚合物，由二氧化碳與環氧丙烷來製造。此種聚合物在醫療上有許多應用。</p>
3. 重要收獲及心得 <p>從 Darensbourg 教授的演講，我們可以學習到如何設計研發出有用的催化劑，將看似危害環境的二氧化碳轉換成有益環境可裂解共聚合物，並在醫療上具有許多的應用。</p>
4. 其他意見

# 綠色/永續化學資訊共享

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## 會議及活動報導

### 2010 美國總統綠色化學挑戰獎

綠色化學，又稱為永續化學，是指減少或消除使用或產生有害物質的化學產品和製程設計。綠色化學適用於每一化工產品的生命週期，包括其設計，製造和使用。



第 15 屆(2010 年)美國總統綠色化學挑戰獎

綠色化學科技提供許多益處，包括：(1)減少廢棄物產生，消除昂貴的最終處理花費；(2)更安全的產品；(3)減少能源和資源耗用；(4)改善化學製造商及其顧客的競爭力。美國環保署促進綠色化學的方式主要是通過著名的總統綠色化學挑戰獎。環保署同時支持各種計畫和方案，包括綠色化學教育，研究和發展等。本年度(2010 年)的總統綠色化學挑戰獎獲獎者包括：

#### • 更永續之合成途徑獎

- 得獎單位：陶氏化學公司、巴斯夫
- 得獎技術：潔淨觸媒製程生產環氧丙烷
- 得獎題目：創新、環境友好的生產環氧丙烷經由過氧化氫
- 得獎內容：

環氧丙烷是全球產量最大的化學品之一，為各類產品包括清潔劑、聚氨酯、解凍劑、食品添加劑、個人護理用品等等的起始物，既有製程的副產品包括大量的廢棄物。陶氏和巴斯夫公司共同開發出一種新的環氧丙烷合成途徑，經由過氧化氫以消除多數的廢棄物，且大量降低水和能源的使用。

#### • 更永續之反應條件獎

- 得獎單位：默克製藥公司、Codexis 公司
- 得獎技術：酶和溶劑以製造藥品

- 得獎題目：使用進化轉氨酶以更環保的方式製造西他列汀
- 得獎內容：
- 默克和 Codexis 公司研發出的第二代綠色合成西他列汀的方法，西他列汀是治療第 2 型糖尿病的 Januvia™ 藥物中之有效成分。兩家公司的合作研究出一種酶製程，可以降低廢棄物量、改善產量和安全性、消除原本需要使用的金屬催化劑。初期研究顯示此一新穎的生物催化劑也可用於生產其他的藥物。

### • 設計更永續之化合物獎

- 得獎單位：克拉克
- 得獎技術：環境友好的殺幼蚊劑
- 得獎主題：Natular™ 殺幼蟲劑：新一代控制蚊子數量的調適殺菌素
- 得獎內容：
- 針刺型殺菌素是一種對環境安全的農藥，但是在水體環境中並不穩定，因此不能用於控制蚊子幼蟲。克拉克開發出一種封裝針刺型殺菌素在石膏中的技術，在水中緩慢釋放殺菌素，可以有效控制蚊子幼蟲。這種農藥，Natular™，將取代有機磷和其他傳統有毒農藥，且已被許可用於認證之有機農耕。

### • 小型企業獎

- 得獎單位：LS9 公司
- 得獎技術：工程生物煉油
- 得獎主題：微生物生產的可再生化石™ 燃料和化學品
- 得獎內容：
- 工業化微生物製程通常產生單一物質，如類似植物油的甘油三酯。該單一物質後，再經過純化並轉換成其他化學品，如生質柴油燃料。LS9 公司基因工程許多種微生物來扮演煉油廠的角色。每一微生物生產最終一特定的最終化學品，這些產品中例如 UltraClean™ 柴油。此種生質燃料可以消除石化柴油中常見的苯、硫、和重金屬。

### • 學術獎

- 得獎單位：詹姆斯 C 廖博士，Easel 生技公司及加州大學洛杉磯分校

- 得獎技術：轉換二氧化碳為燃料
- 得獎主題：回收二氧化碳以生物合成高碳醇
- 得獎內容：

由發酵來的乙醇可作為燃料中的添加劑，其缺點是能源使用效率低。“高碳”醇（有兩個碳原子數以上的醇）具有較高的能量含量，但自然界微生物不會生產它們。廖博士和他的同事使用基因工程微生物，直接從葡萄糖或二氧化碳生產高碳醇。他的成果促使可再生的高級醇可以作為化學品的建構基礎或燃料的應用。

## 永續合成化學工作坊後記

甘魯生 吳丁凱 周德璋 廖俊臣 趙奕妤 劉廣定  
(依姓名筆劃順序)於 2010/4

推動綠色/永續化學、能源及工業已成全球之趨勢，台灣自不例外。政府陸續推出獎勵綠色能源政策，行政院核能研究所自2003年成立永續能源科技中心。工業界自小型的研發到大規模的投資(如鴻海科技集團宣佈發展太陽能)等都是具體的表現。不過工業的根本在教育，中國化學會環境與化學委員會及行政院國家科學發展委員會化學研究推動中心以培養學界與業界之種子教師為目標，聯合舉辦『永續合成化學工作坊』，期望以此促進永續合成早日在國內紮根，並藉著學界與業界共聚一堂的機會，增進彼此的交流。參加工作坊者學術界49人(包括大學及學院45人，公立研究機構 4人)，業界及社會人士75人。其中以相關公司及工廠從事人員最多，其他出席者有來自工會、產業協進會、技師事務所、研究機構、投資顧問公司、檢驗機構等，出席者遍佈全島各地，十分踴躍參加，也頗具代表性。

於2010年2月1日在台大化學系松柏演講堂舉行之工作坊，其講習內容為六場演講，依時間先後分別是：

- 1.綠色/永續化學的歷史、內涵、現狀與面臨的挑戰(吳丁凱、趙奕妤主講)
- 2.永續性合成原則與指標(甘魯生主講)
- 3.『非傳統』反應方法與溶劑(劉廣定主講)
- 4.觸媒反應新趨勢(廖俊臣主講)
- 5.『可再生性』資源產物在合成上的應用(劉廣定主講)
- 6.工業界綠色永續合成的實例(周德璋主講)

內容設計是由淺而深的敘述綠色化學合成之緣起、定義、原則、方法及應用。除了第一個講題時間訂為30分鐘，其他為50分鐘。最後有綜合座談，與出席者交換意見(吳丁凱主持)，座談的內容與收回之問卷內容大致雷同，試分析問卷如下，以供未來的籌辦者參考。

共發出124份，回收 80 份，回收率65%。

出席者是否瞭解此講習會之意義與目的之問題，答瞭解佔46%，非常瞭解佔51%。表不瞭解者無。

對講習內容表示滿意佔53%，非常滿意佔40%，表不滿意者無。

有38%及54%表示滿意及非常滿意此次之師資，表不滿意者無。

正面意見如下：

- (1) 內容豐富、也把綠色化學概念深深傳播給來參加研討會的先進。
  - (2) 提供許多相關非常實用的例子與指引，省去許多摸索的時間，確實有達到本次課程目的，多謝教授的用心。
  - (3) 老師將許多新的科技列出來，對於聽的人可以有很多 inspiration。
  - (4) 課程內容給予目前研發單位不少靈感。
- 作為主講者的我們，十分感謝與會者的肯定及支持。

講習內容方面建議的有：

- (1) 給業界在進行永續化學這一方面更明確的建議。
- (2) 多介紹以申請專利或介紹引用成熟的技術方法案例。

- (3) 針對台灣化學工業產業界產生大量廢棄物或污染物的問題，由工作坊提出適當統計普查報告，促成合成化學家的注意，提供解決之道。
- (4) 討論應增加化學工程師，增加我國案例。
- (5) 希望有多一些具有業界經驗的人來共同分享，報告他們符合永續綠色的設計。
- (6) 多與業界應用結合、提供資訊及案例，提供企業、生產、製造啟發。
- (7) 期望日後能補充材料與設備方面的知識。
- (8) 增加分析(微量 solvent 的使用)。
- (9) 增加分析相關。
- (10) 增加 Separation and identification chemistry。
- (11) 增加高分子應用相關方面。
- (12) 建議邀請化工業界參與討論或提供議題。
- (13) 了解各產業明確的成果。

其他實質做法方面的建議有：

- (1) 是否能定期討論(每 2 個月)，解說當代重要的化學訊息、技術、新 METHOD 等，以增進化學發展及應用。
- (2) 開設永續分析化學相關課程，目前分析所需藥品多為環境不友善物質，應討論替代材料或方法。
- (3) 專業教授與工業製程設計師與業界人員一起參加，有增進彼此交流的機會。
- (4) 座談會聘請國內外化工業研發單位代表。
- (5) 師資增加業界真正有經驗者。

對主辦單位的建議有：

- (1) 請政府政策執行與宣導、建立相關法令及標準規範。
- (2) 該議題仍需化學學會及國科會的推動。

對工坊舉辦的缺點有：

- (1) 內容有重複之處。
- (2) 中場休息時間不夠，易疲勞，大家無法利用該時間做意見交換。
- (3) 關於業界的比例略少，而提及內容大多偏重藥物。
- (4) 每人報告時間不宜太長。

最後與會者一致同意此類工作坊應擴大至各地舉行，並有業界人士希望比照國外企業界舉辦圓桌會議，討論出大家共同面對的問題，以向外(如學術界)徵求解決之道。目前高雄義守大學與高雄師範大學已向講師們提出邀請，預計五月七日將由兩校與化學會高雄分會合辦下一場之永續合成工作坊。

由於過去國內化學界較少舉辦這樣的研習會，提供整理過的資料給專業人士，此次工作坊可謂是一個實驗性的活動。而實驗結果顯示在永續議題上，大家對資訊的需求相當殷切，也都期望國內化學化工相關的組織能有積極之作為。我們將向相關單位轉達這樣的呼聲。



緣起:

綠色化學研究所(Green Chemistry Institute)由 Joseph Breen 於 1997 年結合產官學所創立.是一非營利組織.主要目標在於宣導及推動綠色化學.2001 年元旦編入美國化學會.兩組織共同為設計及發現減少產生及揚棄有害物質之化學產品及製程而努力.年會仍以創立年為起始,今年是第十四屆.同時也慶祝綠色化學十二項原則發表第十二週年.今年揭櫫的口號是『藉綠色化學的力量來提振改造』.



與會經過:

會議於本(99)年六月廿一日至廿三日一連三天假美國華府首都希爾頓大飯店舉行.議程包括六個大會演講.



(華府首都希爾頓大飯店)

## A. 大會演講紀要

第一場: 六月廿一日上午九時一刻至十時一刻

主講人: Paul Hawken, 環境保護者, 企業家, 作家.



(Paul Hawken)

Hawken 先生的作品發人深省,美國前總統柯林頓曾說:『讀了 Paul Hawken 的書改變我的人生。』他自 20 歲起即獻身於永續經營,並致力改變商業和環境之間的關係。

Hawken 先生講述了他最近到世界發生嚴重生態損壞事件的地方如冰島火山噴發,墨西哥灣漏油視察的經過. 他認為我們地球所有的居住環境都在下滑,而且下滑的速度在加劇中. 所以我們的文明必須有新的操作系統. 而我們每一個人都是寫這系統的程式家. 我們每一個人都要身體力行改變居住環境的惡化.

第二場: 六月廿二日上午八時三十五至九時三十五分

主講人: Paul Anastas 博士

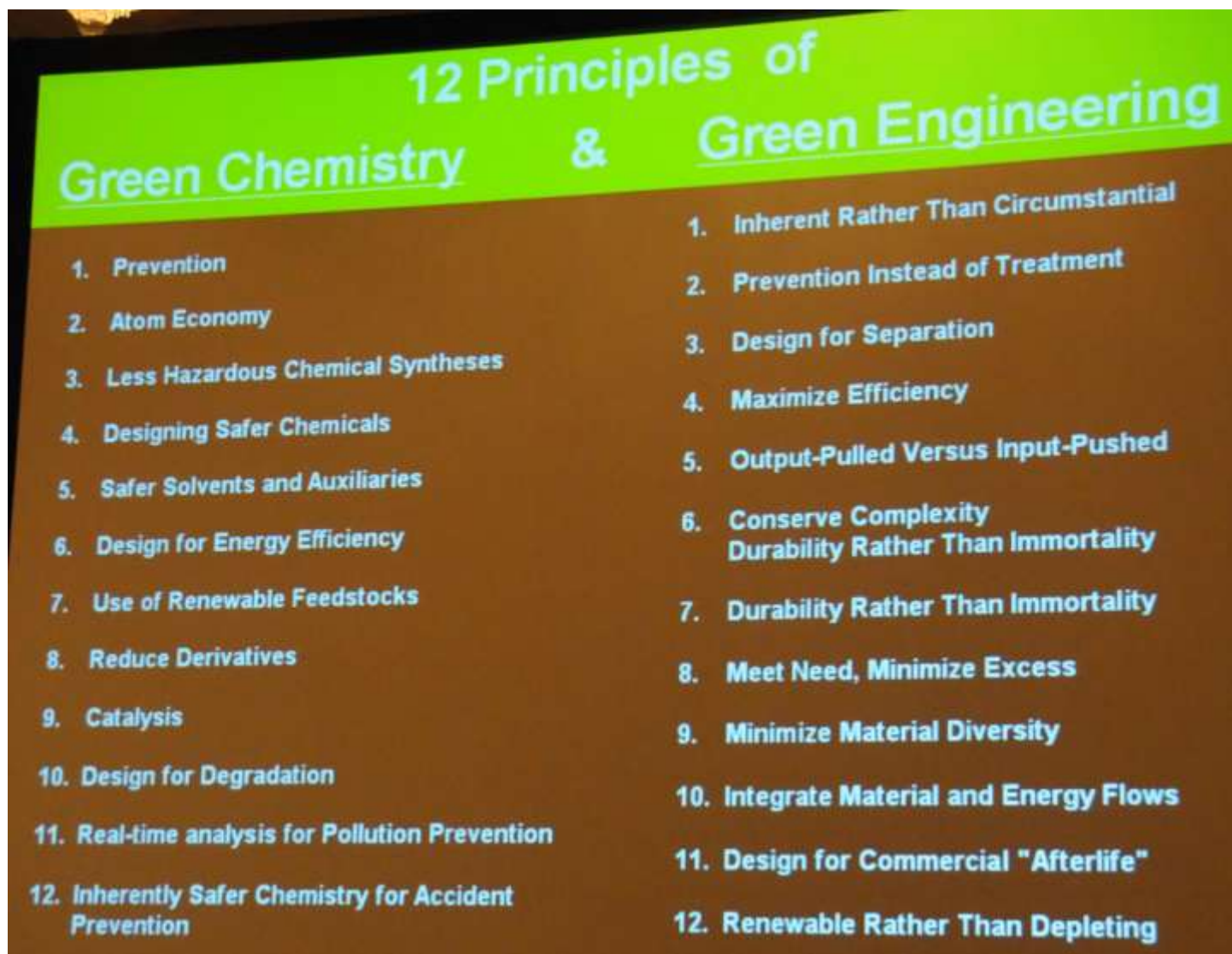


(Paul Anastas)

Anastas 博士外號『綠色化學之父』.此君對綠色化學貢獻良多,12 原則就是他和 John Warner 一起制定的,他在 1989 年從 Brandeis 拿到有機化學博士後進入美國環保署 (EPA) 從基層做起,不數年晉昇為工業化學處處長及全國綠色化計畫主任,在這期間 Anastas 博士領先啓用了『綠色化學』一詞,將之與『永續化學』通用.而成為更大眾化的用詞了. Anastas 博士研究的興趣在於設計更安全的化合物、以生物物質為組成成份的聚合物和更有效並減少釋放有害物質至環境的化學合成方法.他是綠色化學十二項原則起草者,後又訂立綠色工業十二項原則.至今為業者奉為圭臬. Anastas 博士 1999 年

離開 EPA 到白宮科學和技術政策辦公室工作五年之久(1999-2004),再轉任美國化學會綠色化學研究所主任三年(2004-2006). 2007 年被耶魯大學聘為 Teresa and H. John Heinz III 講座教授並主持綠色化學中心.今年更上層樓被美國總統任命為美國環境保護總署(EPA)研究暨發展辦公室助理長官和科學顧問(Assistant Administrator for EPA's Office of Research and Development and the Science Advisor).是個典型『學而優則仕』的例子.

Anastas 博士演講主旨很簡單,要大家創風氣之先,在各個崗位,各種場所宣揚和領導大家做綠色化學.如今地球昇溫加劇,讓綠色化學之觀念深植每位公民心中,變成一種本能,此其時也.



(綠色化學十二項原則及綠色工程十二項原則.翻攝自 Paul Anastas 幻灯片)



第三場大會演講(六月廿二日十二時二十至一時二十分)是由 Steven Webster 主講.



(Steven Webster)

Steven Webster 現職是 3M 資深副總裁,主管科技部門.他表示工業界要身體力行綠色化學,在 3M 奉行的三項原則是重新組合、替代和重新設計,一個口號是『污染是要付出代價的』.所有 3M 產品都照這些原則生產.他更舉例大家常用之貼紙(post it)已完全符合,紙是再生紙,膠可為生物所分解,所生產的貼紙不必再伐木,也不會污染環境.

第四場大會演講(六月廿二日下午四時三十至五時三十分)是由諾貝爾化學獎得主 Robert Grubbs 博士主講.



(Robert Grubbs)

在加州理工學院任教的 Grubbs 博士和 Richard R. Schrock(麻省理工學院)以及法國化學家 Yves Chauvin 以『The development of the metathesis method in organic synthesis』共同得到 2005 年諾貝爾化學獎..Grubbs 的演講著重於 metathesis 的應用.它是合成以互換(重新排列)的方式來產生新的分子(塑膠或藥)更有效率同時減少有害物質的產生,在藥學上尤其重要.



(以方塊舞交換舞伴比喻 metathesis 的機制. 翻攝 Grubbs 幻燈片)

第五場大會演講(六月廿三日上午八時至八時三十分)是由 John Tierney 主講。Tierney 先生是麻塞諸塞州選出的國會議員,民主黨籍。他是國會中教育及勞工委員會成員之一,他談了一談他在改革教育立法上的努力,希望將來能多創造綠色化學的工作機會。



(John Tierney)

最後一場是大會主席 John Warner 主講。時間是六月廿三日下午十二時半。



(John C. Warner)

Warner 是綠色化學共同創立人之一,他和 Paul Anastas 共同寫了一本『Green Chemistry: Theory and Practice』,此書首次揭櫫了綠色化學十二項原則。Warner 博士在拍立得工作了一段很長的時間,1997 年他受聘麻州大學波士頓分校化學系。在那裡成立了世界第一個綠色化學博士學程。他也是麻州大學 Lowell 分校綠色化學課程的創立人。現在是他創立的 Warner Babcock 綠色化學研究所的董事長。

他演說內容和 Paul Anastas 相呼應。化學造就了這個世界,要救也要用化學,用綠色化學,希望以後的化學皆為永續,綠色一詞就不必再用。希望工界要自律。促進綠色化學要起而行,大家一起來。

## B. 口頭報告

共廿七個口頭報告議程,分四組同時進行.其中『教育』和『環境健康科學』各佔了三個,『十二項原則』,『能』,『仿生物系統』,『生物物質』,『企業學』,『合成及催化』,『鍍膜和高分子』和『藥劑學』各二個,『挑戰綠色化學總統獎得主的報告』,,『電子物質』,『永續設計觀念』,『供應鏈管理』,『為什麼政策對科學家很重要』,『分析化學』,和『量度及化學品管理』各一.這個會議參加人數雖少(註冊出席總人數:446),但議程仍包羅各領域.本人應邀在『教育』議程中報告了我國綠色教育之現況,其中包括高中、大學及研究所的課程.政府現行之節能減碳政策及努力以及民間團體(如中國化學會之『綠色/永續合成化學工作坊』)所做的工作.普遍獲得良好回響.無獨有偶的是一位在耶魯綠色化學中心工作的博士後(崔錚)在週三報告了『中國綠色化學教育之現況』.中國浙江大學成立了綠色化學暨工程研究所,從事多項研究如二氧化碳之固定、離子溶劑、防火聚合分子、再生原料等.其中許多具有地方的特性如竹的研究.

美國在綠色教育上的努力可以說是全面的,大學有綠色化學課程,社區有綠色化學計畫,如五大湖地區計畫,因為當地人非常恐懼五大湖因污染而變成死湖.熱心的大學生則自動到社區高中授課及辦活動.這和大同大學生工系創刊『綠能及綠色化學月刊』不謀而合.

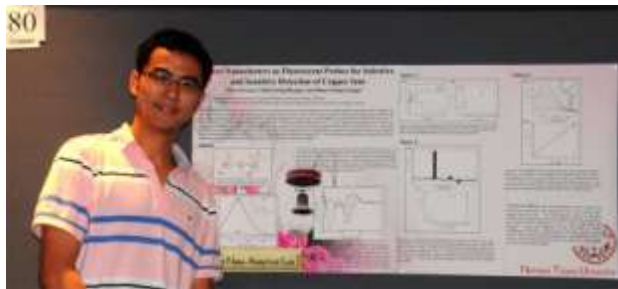


(中國出版的中文綠色化學書)

## C. 壁報展覽

時間為六月廿二日一時廿分至二時廿分,時間為一小時,約有二百個,時間雖短,但討論熱烈.筆者走馬看花也能看完.學生有競賽,最後 Tylisha M. Brown 的 Hydrothermal processing for production of bio-fuels from algal biomass 及 Frank Geilen 的 Selective conversion of biomass-derived carboxylic acids by homogeneous catalytic hydrogenation 得獎,

二人各得獎狀及美金 1000 元獎金。我國共有四篇論文分列於『能』(二篇)、『生物物質』及『合成及催化』，作者來自台大、台北科大及海洋大學。



(台大學生藍國毓和他的壁報)

D. 『第 15 屆挑戰綠色化學總統獎』頒獎典禮。

挑戰綠色化學總統獎頒獎典禮在六月廿一日下午五時半於雷根大樓舉行。離首都希爾頓地下車二站路，往返還算方便。

今年的得主有：

**學術獎** James C. Liao, UCLA

得獎的論文 Recycling carbon dioxide to biosynthesize higher alcohols



(James C. Liao)

**小型企業獎** LS9, Inc.

得獎的作品 Microbial production of renewable petroleum fuels and chemicals

**更永續之合成路徑獎** The Dow Company

得獎的作品 Innovative, environmentally benign production of propylene oxide via hydrogen peroxide

**更永續之反應條件獎** Merck & Co., Inc.

得獎的作品 Greener manufacturing of sitagliptin enabled by the evolved transaminase

**設計更永續之化合物獎** Clarke

得獎的作品 Natular larvicide: adapting spinosad for the next-generation mosquito control



(獎盃)

感想:

此會議規模雖小(參加人數不到 500 人)但內容豐富,三天相處可接觸到不同層次的人物,學到新的事務.

廠商及公司大力挹注財力,表現支持的熱情.



(部份贊助廠商)

會議幾乎固定在首都希爾頓開,此旅舍設備現代,僅離美國化學會一條街之距,因此很容易得到化學會人力支援.是一個成功的會議.



(美國化學會大樓)

建議事項:

A. 成立綠色化學研究所, B. 成立綠色化學國際分會, C. 出版中文綠色化學書籍

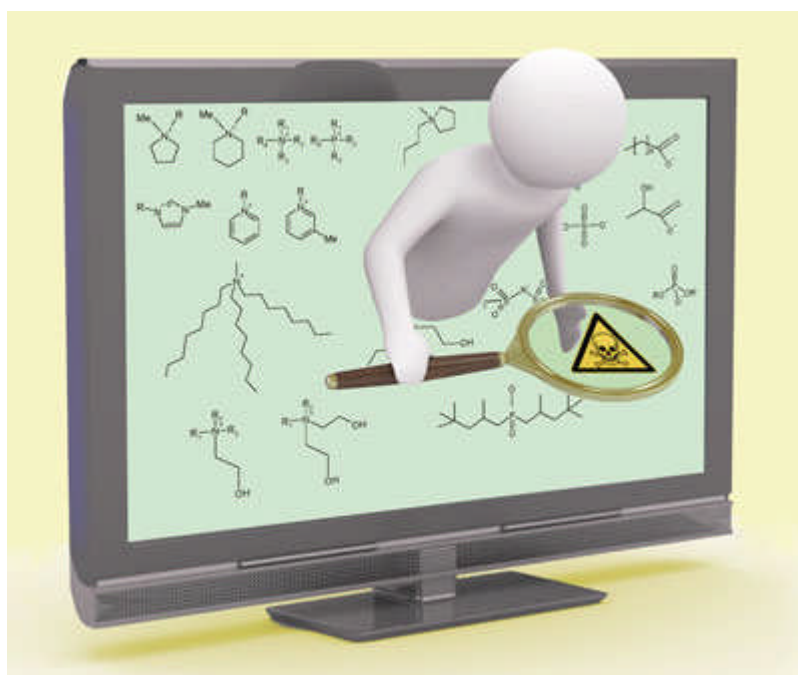
攜回資料

大會議程一本.

## 研究突破

### 即時洞察力：搜索綠色離子液體

Nicola Wood 以及 Gill Stephens 討論測試和預測離子液體毒性的可行方法。離子液體有各種應用，例如可以被作為綠色替代溶劑以取代傳統的工業生產過程中的溶劑。他們有低的飽和蒸氣壓和不易燃、不易爆，意謂他們目前在封閉的過程中減少危害或環境風險。不幸的是，第一代離子液體是建立在咪唑或吡啶陽離子基礎上，這可算是一般的有毒溶劑，有時甚至更糟。由於現在越來越多的應用中發現離子液體的蹤跡，例如電池、紡織品和化妝品，因此，透徹瞭解潛在的健康危害和對環境的影響是至關重要的。離子液體的優點在於結合不同陽離子和陰離子產生全新獨特的結構和性質。針對不同特定性能的溶劑應用，幾百萬可用的可用結構，是一個工程設計溶劑的很好機會。但它也造成了一個不同尋常的問題，即人工合成、鑑定和測試，似乎是有無限可能性，幾乎是不可能的任務。



查明數以百萬計的可能的結構去找出非毒性的離子液體是艱難的

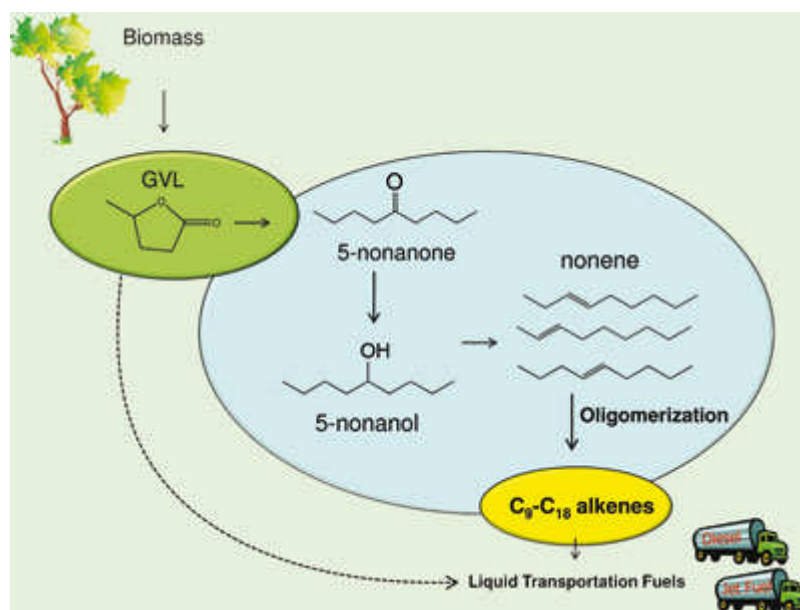
最近發現無毒、可生物降解的離子液體越來越多了。無毒、可生物降解的這類離子液體是真正的綠色，因為他們對環境的影響很小。毫無疑問地，我們仍然需要探索更多的環保結構 - 新的挑戰是要找到它們，因為預測離子液體的毒性仍然是非常艱難。利用新高通量離子液體的篩選，加上現有的資料模型顯示結構與毒性關係，我們發現親脂性陽離子與毒性關聯性非常強烈。最近研究顯示，結構上改變陰離子也會對毒性造成非常重大的影響。但是，對於更多的結構進行生態毒

性測試是有必要的，唯有如此足夠的資料，才可以制定可靠的模型來預測毒性。在此期間，發現無毒離子液體的主要途徑，是依賴高通量合成與篩選。毒性的篩選需要以最大測試量、最小的成本、便利和最少的材料使用，以應付大量的結構設計。毒性篩選的方式有很多，每種測試搭配相映特定的生物體來進行。但是，不同的生物對不同的化學毒物反應不同，因此很多的補充試驗需要進行，以確定對環境可能造成的影響。最近開發出一個初步的詳細生態毒性測試電池，能夠進行高通量篩選，此最有前景的測試結果，是它可以隨著生物複雜性增加而以同一個等級來進行測試。市售細胞活力測試袋使用離子液體的體積較小，但可能很昂貴，需要專門的設備以閱讀的結果。最近，瓊脂擴散試驗，這一種被廣泛用於測試對抗微生物性，已被使用來測試離子液體毒性。這是非常容易使用，僅需要最少的微生物學方法經驗，儀器也很簡單。離子液體添加到濾紙盤然後轉移到已製備微生物細胞的培養皿。如果濾紙上環繞的一個區域是乾淨，這表示離子液體是有毒，此乾淨區的大小表示其毒性等級。這將有可能在合成化學實驗室中，使用這種簡單的測試。這將使人們除了獲得簡單毒性測試數據外，同時可以搭配傳統鑑定毒性方法，對新的離子液體初步進行測試。因此，它將可能成為離子液體的早期生態毒性測試中最有希望的方法，加快引進新的非毒性離子液體。總體而言，離子液體未來似乎是光明。該結構的多樣性是如此之大，就像任何其他化學品，有些是有毒的，有些是良性的。無毒離子液體就在某處，我們只需要找到它們。

來源：*Green Chem.* 06, April, 2010

## 來自生質能的噴射燃料

生質燃料在解決能源問題上更進一步了，這都感謝美國科學家研發的新製程。由於化石燃料資源繼續減少，因此我們更需要開發一個可再生資源生產燃料的新辦法。太陽能電池和氫燃料可以提供長期的解決方案，但最直接的方法是用生物燃料替代汽油。首先，第一代生質能：乙醇生物燃料和生物柴油已經表明這是可行的，但他們只能滿足運輸部門的能源需求的一小部分，而且這種能源的原料還與日益激烈的食用生物質競爭耕地。因此，第二代生質能來自於木質纖維生物能，這將不會影響全球糧食生產。但是到現在為止只被用作燃料的混合物，這意味著石油衍生烷烴仍是燃料主要來源。



生物質可以轉化為長鏈噴射燃料和柴油

James Dumesic 在美國 Wisconsin-Madison 大學和大學的同事開發出一種新工藝，生產來自乙醯丙酸的可再生液體燃料，它類似現有石油運輸燃料。Dumesic 將乙醯丙酸氫化成對  $\gamma$ -內酯，這也是作為一個混合乙醇汽油中的代替品。 $\gamma$ -內酯接著與 5-壬升級反應成液態烴燃料。C9 酮生產出 C9 烯烴混合物，Dumesic 利用多酸催化劑製備長鏈 C18 烯烴，經過氫化可作為燃料使用的噴射烯烴。Dumesic 的組成員之一 Jesse Bond 說，這項工作的重大意義在於，它是一種柴油範圍的碳氫化合物燃料（C18 的製備途徑所得的碳水化合物原料）。在西班牙的 Cordoba 大學的 Rafael Luque 也贊同這樣利用可再生能源的觀點，從烴低聚反應產生出不同的生質能將是一個有趣且有潛力的新方法。另外，他有興趣看看這個基於複雜烯烴混合以及其他柴油類燃料的過程如何發展。Bond 說：'未來成功的生物精煉戰略將依賴於生物量組分的有效率利用和創造性，以填補目前的石油需求滿足。如果乙醯丙酸和  $\gamma$ -內酯可以較低成本大量生產，將會是有很大潛力的技術。'

來源：Green Chem. 27, April, 2010、Green Chem., 2010, 12, 992

## 從生物煉製碳水化合物技術—美國能源部

一個利用高價值生物品製備低價值生物品的生物精煉廠，可以降低不可再生能源的使用，例如減少燃料消耗，但這工廠必須獲得必要的財政獎勵以刺激擴張。然而，對於除了選擇合適的產品，由精煉廠製備的投資組合是一個挑戰外，加上缺乏一個廣泛基礎的大量且有潛力目標的轉換技術。2004 年，美國能源部 (DOE)



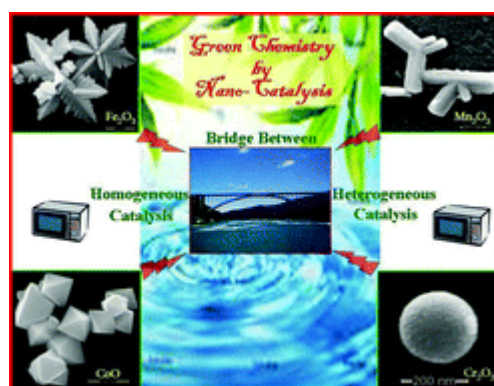
強調這些挑戰，包含從化學製程中選擇出可以結合鑑定來自於生物煉製技術研究的一小群化合物以及產品所需的技術。該報告的目的是為了促進合成這一來自於生物煉製技術研究群體的數量，或結構尚未在名單上的研究工作。6年以來，自從美國能源部開放研究報告，已使用生物煉製碳水化合物作為合成反應的起始物。這次審查使用類似的選拔方法，提供了一個潛在目標物的最新評估，和對技術的發展得到的某一化合物進行概述。這份名單提供了一個科技發展的動態指



來源：*Green Chem.*, 2010,12, 539–554

## 奈米催化下的綠色化學

奈米材料在許多不同領域都是重要的，從基礎研究到應用在各種電子、生化感測器、催化和能源。它們已經成為傳統材料的可持續的替代品，例如作為強大的高比表面積多相催化劑和催化劑載體。奈米大小的微粒增加了催化劑的活性組分暴露面積，從而提高反應物和催化劑之間的接觸和模仿大相催化劑。該文的重點是奈米催化劑下的綠色化學發展，包括使用微波加熱奈米催化劑在水相良性反應，它提供了更大潛力非凡的協同效應。為了說明且證明型這個綠色和可持續方式的概念，該文中討論具有代表性的例子。



來源：*Green Chem.*, 2010,12, 743–754