

**CACS Annual Symposium: Focus on  
Frontiers of High Throughput Technologies and Applications**

**Jointly sponsored by the Chinese American Chemical Society and  
The Department of Pharmaceutical Chemistry  
Ernest Mario School of Pharmacy, Rutgers University**

Saturday, June 5th, 2004

Fiber Optics Auditorium, Rutgers University  
Busch Campus, 607 Taylor Road  
Piscataway, New Jersey 08854

A Letter from ACS President-Elect: Dr. William F. Carroll, Jr.....	2
Forward .....	3
Agenda .....	4
About Speakers .....	6
Abstracts .....	11
Acknowledgements.....	14

## A Letter from ACS President-Elect: Dr. William F. Carroll, Jr.

Dear Dr. Qian:  
2004 CACS Symposium Program Chair

While it is impossible for me to be present at the CACS Annual Symposium, I wanted to send a note thanking you for your kind invitation to attend. The program, "Frontiers of High Throughput Technologies and Applications" is clearly scientifically important for researchers in areas from pharmaceuticals to catalyst development. The speakers are first class, and the topics are well-chosen.

I am glad to see that the discussion also extends to include the business aspects of bringing science to practical application. And the most important session might be the one introducing the CACS Mentor Program. Mentoring students and young scientists early in their careers is an important factor for success.

All in all, I extend my best wishes to you, to Dr. Teh Ho, CACS President, and to my other friends in the Tri-State CACS. Have a wonderful and productive conference.

Very truly yours,

A handwritten signature in black ink that reads "Bill Carroll". The signature is written in a cursive, flowing style.

William F. Carroll, Jr.  
ACS President-Elect

P.S.: Please give my very best regards to Dr. Ge Li. I worked in the city of WuXi in the late 1980s and remember it fondly.

## Forward

Welcome to the 2004 CACS Annual Symposium!

Since its foundation in 1981, the Chinese American Chemical Society (CACS) has played a "catalytic" role in fostering interactions and networking among Chinese-American chemists, biochemists, chemical engineers, and those working in related fields. The Society has also provided opportunities for its members to participate in joint business ventures.

The 2004 Tri-State CACS annual symposium has two themes: "Frontiers of High Throughput Technologies and Applications" and "Career Development." In recent years, the field of high-throughput experiments (HTE) has increasingly extended its scope from pharmaceutical research to chemical process/product research. Among the most notable events witnessing this trend is the recent \$200 million alliance between ExxonMobil and Symyx. This symposium aims to promote science and technology developments in this rapidly evolving area. Specifically, the topics cover high-throughput analytics, experimentations and advanced applications in both heterogeneous and homogenous environments, and intellectual property issues.

The topics for career development range from career management in a corporate setting to starting your own company. The CACS also proudly launches a mentor program aimed primarily at its junior members who are just starting their professional careers.

We are fortunate to have been able to invite 12 distinguished speakers whose participation vastly strengthens the symposium. Their diverse backgrounds and geographical locations give us global perspectives on the state of the HTE and our career paths and options. We express our deep sense of gratitude to all speakers.

We greatly appreciate the financial support of many companies and organizations listed in the Acknowledgement section. Their generosity makes this symposium possible. Thanks are also due to many Tri-State CACS board directors, advisors and members for fundraising and program development. Several high school students lend their helping hands. We are grateful for Rutgers University's comfortable meeting facilities. Not least, we thank you all for your active participation in this exciting event.



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Kuangnan Qian  
Symposium Program Chair  
President of Tri-State CACS



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Teh C. Ho  
President of National CACS

## Agenda

8:15 AM On-site Registration, Vendor & Poster Setup, Wake Up Coffee & Donuts

8:50 AM Welcome Remarks Dr. Kuangnan Qian, Tristate CACS President

Session Chair: Kuangnan Qian, ExxonMobil

9:00 AM Dr. Jeffrey S. Beck, Director of Catalyst Technology, ExxonMobil  
Research & Engineering Company  
"Catalyst Technology & HTE at ExxonMobil - Approaches Towards  
Catalytic Materials of the Future"

9:30 AM Professor Jack Henion, President of Advion BioSciences  
"Recent Developments and Trends in High-Throughput MS and MS/MS  
Analyses"

10:00 AM Dr. Helen Han Hsu, Sr. Director at Drug Evaluation-  
Toxicology/Pathology, Johnson & Johnson Pharmaceutical R&D  
"Career Path in a Corporate Setting"

10:20 AM Social break

Session Chair: Longqin Hu, Rutgers University

10:40 AM Professor Gerben J. Zylstra, Director of Biotechnology Center for  
Agriculture and the Environment, Rutgers University  
"High Throughput Screening Applications for Microbial Functional  
Genomics"

11:10 AM Dr. Ulrich E. Hackler, Business Manager of Chemspeed, UK  
"Avoiding Bottlenecks in High Throughput Experimentations"

11:40 AM Dr. Jassy Wang, Deputy General Director, Union Chemical Lab., ITRI,  
Taiwan, ROC  
"Combinatorial Chemistry for Novel Material Development at ITRI"

12:10 AM Lunch

Session Chair: Yuguang Wang, Schering Plough

1:10 PM Dr. Brian McKittrick, Associate Director and Head of CombiChem,  
Schering Plough Research Institute  
"High-Throughput Synthesis: Impact on Drug Discovery and Beyond"

- 1:40 PM Dr. Ge Li, Chairman and CEO, WuXi PharmaTech Co., Ltd. Shanghai, China  
"R&D Outsourcing and High Throughput Research in China-a History and Recent Development of PharmaTech"
- 2:10 PM Dr. T. Ben Hsu , V.P., Finance & Control, Quest Pharmaceutical Services  
"From Bench Work to Business World"
- 2:30 PM Social Break

Session Chair: Teh Ho, ExxonMobil

- 2:50 PM Dr. Kent H. Cheng, Cohen, Pontani, Lieberman & Pavane  
"Patent Trends in High Throughput Technologies"
- 3:20 PM Dr. Joseph Mo, CEO, NexMed, Inc.  
"How Best to Start a Company and Develop it into a Nasdaq Listed Company in 3 to 5 Years"
- 3:40 PM Dr. Lisa I. Yeh, Advanced Research Associate, ExxonMobil Research & Engineering Company  
"Adapting to the US Work Environment"
- 4:00 PM Introducing CACS Mentor Program, Dr. Yongkui Sun, Merck Co./Dr. Lisa I. Yeh, ExxonMobil
- 4:10 PM Concluding Remarks, Dr. Teh Ho, CACS President
- 4:15 PM Meeting Adjourned

Registration: Free

Register Online at: [www.tristatecacs.org](http://www.tristatecacs.org)

Vendor & Sponsor Contact:

Kuangnan Qian at 908-7302013, [kuangnan.qian@exxonmobil.com](mailto:kuangnan.qian@exxonmobil.com)

## About Speakers

### **Professor Jack Henion, Cornell University/Advion BioSciences, Inc**

Jack Henion is Emeritus Professor of Toxicology at Cornell University where he was a member of the College of Veterinary Medicine since 1976. During his tenure at Cornell Professor Henion conducted research and explored applications in many areas of liquid chromatography/mass spectrometry (LC/MS) and related areas using atmospheric pressure ionization (API) sources. Dr. Henion is Chairman, President, CEO, of Advion. BioSciences, Inc., a premier contract research organization that provides LC/MS/MS services and products to the pharmaceutical industry. Advion also has developed and marketed a novel microfabricated chip and associated robot called the NanoMate 100, which it commercialized in mid 2002. This novel product combination offers automated nanoelectrospray mass spectrometry for applications in proteomics and small molecule drug characterizations

Dr. Henion has received two Doctor Honoris Causa (Honorary Doctorate) degrees in recognition of his international reputation in modern analytical techniques. One is from the University of Ghent, Belgium for his work in trace residue analysis in biological samples, and the other was awarded in May, 2000 from the University of Uppsala, Sweden in recognition of his research in modern LC/MS/MS bioanalytical techniques. In the Spring of 2001 Prof. Henion was recognized as the College of Science outstanding alumnus of the year from the Rochester Institute of Technology where he received his MS degree in analytical organic chemistry in 1967. In the Fall of 2003 Prof. Henion received the Martin Medal for his contributions to the separation sciences coupled with mass spectrometry.

### **Dr. Brian A. McKittrick, Associate Director, Chemical Research, Schering-Plough Research Institute**

Dr. McKittrick grew up in southern NJ. He attended Southampton College of LIU where he obtained a BS in Marine Science Chemistry in 1979. After completing his PhD with Robert Stevenson at Brandeis University in 1984, he did postdoctoral work with Bruce Ganem at Cornell. He joined Schering-Plough in 1986 and worked for 9 years in the cardiovascular chemistry group. This work ultimately lead to the discovery of Zetia, which was approved by the FDA in 2002, for the treatment of elevated cholesterol. For his work in this area, he received the 2002 Thomas Alva Edison Patent Award.

For the past 7 years he has focused his efforts on the development and use of combinatorial and high-throughput synthesis for new drug discovery. His high-throughput-synthesis group now supports drug discovery research across a wide range of therapeutic areas with both lead discovery and lead optimization libraries.

### **Dr. Helen Han Hsu, Sr. Director at Drug Evaluation-Toxicology/Pathology, Johnson & Johnson Pharmaceutical R&D.**

Dr. Helen Han Hsu, Sr. Director at Drug Evaluation-Toxicology/Pathology, Johnson & Johnson Pharmaceutical R&D. Previously served as Director of Preclinical Drug Development with J&J Consumer Products Worldwide, Skin Research Center. Her past

appointments also include Director of Pathology at Novartis Pharmaceuticals Corporation and Research Pathologist at Wyeth Laboratories and National Center for Toxicological Research. She received her D.V.M at the National Taiwan University in Taipei, Taiwan. She received her residency training and Ph.D. at the department of Pathology, School of Veterinary Medicine at Cornell University. She is a diplomate of American College of Veterinary Pathologists.

**Dr. Joseph Mo, Chief Executive Officer and Chairman of NexMed, Inc.**

Dr. Joseph Mo is, and has been since 1995, Chief Executive Officer and Chairman of NexMed, Inc. ([www.nexmed.com](http://www.nexmed.com)), a public company whose securities are listed on the NASDAQ National Market under the symbol of NEXM.

Prior to joining the Company in 1995, Dr. Mo was President of an investment consulting company. He was President of the Chemical Division, and the Vice President of Manufacturing and Medicinal Chemistry, of Greenwich Pharmaceuticals, Inc., from 1988 to 1994. From 1977 to 1987, he served in various executive positions with several major pharmaceutical companies, including Johnson & Johnson, and predecessors of Aventis and Glaxo SmithKline. Dr. Mo received his Ph.D. in Industrial and Physical Pharmacy from Purdue University in 1977.

**Dr. Kent H. Cheng, Partner of Cohen, Pontani, Lieberman & Pavane**

Dr. Kent H. Cheng is a partner in the intellectual property law firm of Cohen, Pontani, Lieberman & Pavane in New York City. His practice of more than fifteen years includes client counseling, patent prosecution, opinion work, licensing and litigation in various areas including pharmaceuticals, biotechnology, medical devices, chemical processing and semiconductor fabrication. Dr. Cheng received his B.A. in Chemical Physics in 1974 from Columbia University; Ph.D. in Chemistry in 1978 from Brandeis University; and J.D. in 1991 from Pace University School of Law.

His patent prosecution experience includes drafting patent applications and procuring U.S. and foreign patents. He has written opinion letters advising clients regarding patentability, patent validity, infringement and trade secrets; conducted audits of clients' system of procuring, maintaining and using patents; advised clients regarding confidentiality, licensing and employment/consultant agreements; and drafted settlement agreements and licensing agreements among multinational companies in the area of computer and chemical processing technologies. He has advised clients in trademark and trade dress disputes, and in the area of unfair competition. Dr. Cheng has also participated in litigation cases at the district court level, the Court of Appeals for the Federal Circuit and the International Trade Commission related to trade secrets, patent infringement, patent validity and government contract research. Dr. Cheng has extensive experience in pharmaceutical and biotechnology litigation and related Food and Drug Administration matters including The Drug Price Competition and Patent Term Restoration Act of 1984 (the Hatch-Waxman Act). He has represented clients in administrative proceedings in the U.S. Patent and Trademark Office including reexaminations, interferences and appeals to the Board of Patent Appeals and Interferences.

**Professor Gerben J. Zylstra, Director of Biotechnology Center for Agriculture and the Environment, Rutgers University**

Professor Gerben Zylstra is an internationally-recognized expert in the genetic and biochemical analysis of microbial aromatic hydrocarbon degradation pathways. He uses a variety of genetic tools in his research, including computational sequence analyses, genomic sequence database analysis & extraction, high throughput clone library construction and screening (by function, hybridization, or sequence), and plasposon mutagenesis (plasmid transposon was coined by Dr. Zylstra). He is the founder and director of the Rutgers DNA sequencing facility and more recently the founder and director of the high throughput robotics laboratory. In 2003 he was named Director of the Biotechnology Center for Agriculture and the Environment. Dr. Zylstra's research approach is to use information gleaned from nucleotide sequence data to decipher and predict the biochemistry and physiology behind aromatic compound degradative pathways. A variety of functional genomic approaches are then utilized to characterize microbial physiological processes at the biochemical level based on the sequence predictions.

**Dr. Ulrich E. Hackler, Business Manager, Chemspeed**

Ulrich Hackler studied chemistry at the Ruhr-University in Bochum (Germany), where he worked on the synthesis of natural products in the research group of Prof. Dr. P. Welzel (M.S.thesis, 1992), and where he also obtained his Ph.D. degree in physical organic chemistry, determining the heat of formation of biradicals of the tri – methylene – methane – type under the supervision of Prof. Dr. W.R. Roth in 1997. He also worked as a postdoc at The University of Tokyo from 1998 to 1999 in the group of Prof. Dr. Eichii Nakamura, focusing on the synthesis and characterisation of water soluble, penta – arylated, fullerene – metal complexes. He joined Chemspeed in September 1999. In 2001 Dr. Hackler became the deputy department head Chemistry & Support. In October 2002 he moved to Commercial Operations, where he is responsible for the Chemspeed Business in Asia, on the Indian Subcontinent and the Middle East. In April 2003 he also became the deputy department head Commercial Operations.

**Dr. T. Ben Hsu, Vice President, Finance & Control., Quest Pharmaceutical Services**

T. Ben Hsu, Ph.D./MBA, joined QPS in 2003 as Vice President, Finance & Control. He was with Aventis Behring, a division of Aventis S.A., from 1999 to 2003. Before joining QPS, he was Director of Global Finance Administration at Aventis Behring. Prior to joining Aventis, he was with Lyondell Chemical Company (previously ARCO Chemical Company) through various functions, including R&D, Engineering, Business Development & Licensing, Manufacturing, Finance, Planning & Control, etc. He received his B.S. degree from National Taiwan University and Master and Ph.D. degrees from the University of Delaware, all in chemical engineering. He also earned an MBA in general administration and finance from Drexel University.

**Dr. Lisa I-Ching Yeh, ExxonMobil Research and Engineering Company**

Dr. Lisa I-Ching Yeh received her B.S. degree in chemistry from the University of Illinois, Champaign-Urbana in 1982, and her Ph.D. degree in physical chemistry from the

University of California, Berkeley in 1988. This was followed by post-doctoral appointments at the Dalian Institute of Chemical Physics and at IBM-Almaden Research Labs. In 1991, Dr. Yeh accepted a position at Exxon Research and Engineering, Corporate Research and worked in the area of fuel combustion chemistry. She designed and built a molecular beam sampling-mass spectrometer to study fuel rich flame chemistry and supplemented experimental data with chemical kinetic modeling. She was given the opportunity to extend the rich flame studies to diesel engine and vehicle programs while on assignment in England which led to several patents on lower emissions diesel fuels. Since returning to the US, Dr. Yeh has been working primarily in lubricant basestocks for ExxonMobil Research and Engineering, Products Research and has been a key player in the quality control and production increase of Group II basestocks to the global market. She has been an author and co-author on over 30 papers and patents and has given many presentations in scientific meetings, both internal and external to her company.

**Dr. Jassy Wang, Deputy General Director, Union Chemical Laboratories, Industrial Technology Research Institute, Taiwan, ROC**

Education

Ph.D., Department of Chemistry, Iowa State University, U.S.A.

B.Sc., Department of Chemistry, National Taiwan Normal University, Taiwan

Experience

Union Chemical Laboratories, Industrial Technology Research Institute

2001 to present Deputy General Director

1999-2001 Director, Electronic Chemical Division

1998-1999 Deputy Director, Electronic Chemical Division

1996-1998 Deputy Director, Chemical Engineering Division

1994-1996 Manager, Chemical Engineering Division

1989-1994 Researcher, Chemical Engineering Division

Research Interests

Synthesis of Organometallic Chemistry

Polymerization Catalysts

Electronic Chemicals

Combinatorial Chemistry

Nanobio Materials

**Dr. Ge Li, Chairman and CEO, WuXi PharmaTech Co., Ltd. Shanghai, China**

Dr. Li grew up in Beijing. After obtaining his B.S. in 1989 from Beijing University, Dr. Li went to Columbia University, New York for his Ph.D. with Prof. Clark Still. In 1993, he joined Pharmacopeia Inc. as one of the founding scientists. In early 2001, Dr. Li found WuXi PharmaTech as a chemistry R&D service company. Currently, the company has 53 international clients and over 200 scientists. Recently, Dr. Li was named as "Top Ten Entrepreneur Award\_2003" in Shanghai.

**Dr. Jeffrey S. Beck, Director of Catalyst Technology, ExxonMobil Research & Engineering Company**

Jeff Beck received his BS in chemistry from the State University of New York at Binghamton in 1984 and his Ph.D. in Inorganic Chemistry from the University of Pennsylvania in 1989. He joined Mobil in 1989, beginning his career at Mobil's Corporate Research Center in the area of zeolite and mesoporous materials synthesis. In the early 1990's Jeff's research expanded to catalytic applications of porous materials and his team developed several new zeolite based aromatics technologies. Several of these, e.g. in the para-xylene area, are now commercial processes. In 1994, at the 10th IZA meeting, Jeff and four other Mobil colleagues were awarded the Donald W. Breck Award for innovation in molecular sieve science, for the discovery of the M41S family of materials. In 1995 Jeff joined Mobil Technology Company's Chemical Division where he worked on commercializing new aromatics catalysts and processes for both Mobil and Mobil's licensees. Returning to Mobil's Strategic Research Center in 1996, Jeff served as Chemicals Skill Leader, leading efforts concentrating on the development of new chemicals applications of zeolitic materials. In 1998, Jeff assumed the position of Group Manager of Mobil's integrated research/technical service efforts in Reforming and Paraffin Isomerization. In this position he worked to create technologies to bridge the Refining/Chemical interface, as well as to build a strong technical service program for Mobil's refineries. In 2000, with the merger of Exxon and Mobil, Jeff joined ExxonMobil's Process Research Department as Director of Catalyst Technology. In this position he is responsible for development and commercialization of catalytic materials for applications throughout ExxonMobil's businesses. He is also responsible for ExxonMobil's High-Throughput Experimentation (HTE) Alliance with Symyx. Jeff is active in the materials science community, and holds over 60 U.S. patents and 35 publications in porous materials and their process applications. In 2003 Jeff was honored as a recipient of the 2003 Thomas Alva Edison award given by the R&D Development Council of N.J. for his work in XYMAX, a new para-xylene producing technology.

**Dr. Yongkui Sun, Director of the Catalysis and Reaction Discovery and Development Laboratory, Merck Co.**

Yongkui Sun received B.S. in chemistry from Xiamen University of China in 1982, and Ph.D. degree in chemistry from California Institute of Technology in 1990. He joined Merck as a Senior Research Chemist in 1993 and is currently director of the Catalysis and Reaction Discovery and Development Laboratory. The mission of the laboratory is to develop catalytic processes for implementation in drug synthesis.

## Abstracts

### **Recent Developments and Trends in High-Throughput MS and MS/MS Analyses**

Jack Henion, Advion BioSciences, Inc. 15 Catherwood Rd., Ithaca, NY 14850

Mass spectrometry (MS) is an essential tool in modern research and applied analytical laboratories. Recent developments include complimentary ionization techniques (EI, CI, electrospray, APCI, APPI, MALDI, etc.) as well as increasingly versatile mass analyzers (magnetic, quadrupole, ion trap, linear ion trap, FTMS) and hybrids of these. One of the greatest developments in support of high-throughput MS is the ability to perform tandem mass spectrometry (MS/MS) experiments and to couple all this capability with the appropriate sample introduction technique, e.g. GC, LC, CE, infusion, etc.

High-throughput analyses place significant demands on all aspects of an experiment. If chromatographic techniques are used short analysis times compromise the separation; e.g. it takes 'time' to affect a good separation. In contrast, MS 'separation times' are very short (microseconds) so many MS experiments may be performed. High-throughput sample analyses therefore often include a compromise in one or more of the features or capabilities of the 'system'. Current developments focus on rapid LC/MS/MS analyses using API techniques. As analytical run times are reduced to less than one minute there are constraints placed either on the chromatography, the acquisition parameters, data analysis or all of these. Managing these variables is key to 'pushing the limits' for rapid analyses.

Historically, capillary GC/MS analytical runs range from several minutes to hours. Impressively complex mixtures may be separated and the components identified, and/or quantified, but sample throughput is rarely considered high. Initially, LC/MS/MS experiments provided run times ranging from 10-20 minutes (3-6 samples/hour) and have more recently decreased to 0.5-5 min (12-120 samples/hour). In an extreme case MALDI MS techniques may be capable of screening or possibly quantifying large numbers of samples without any on-line separation at hundreds or more samples per hour. Several factors can affect sample throughput. Today bioanalytical (quantitative) determinations in, for example, the pharmaceutical industry, continue to push the limits of our capabilities for sample throughput. With judicious choice of coupled techniques we routinely can obtain quantitative determination of multiple analytes from five to ten 96-well plates per day (480-960 samples/day) and in selected cases as many as twenty-four 96-well plates (2304 samples/day) have been reported. A related limitation of these high-throughput analyses is the bioinformatics tools needed to provide the desired final results. A significant reduction in sample throughput results in studies of metabolite or unknown compound identification. In these qualitative experiments one needs high-quality, full-scan CID mass spectra from one or multiple stages of MS/MS. A final restriction in sample throughput is the 'interpretation' aspect of unknown compound identification which in most cases must currently be done manually. An important factor is the MS acquisition time needed to obtain the requisite data. With 'peak parking' or other developing strategies time can be traded from the chromatographic separation step to the time needed to interrogate the analyte to obtain the requisite analytical information. This

presentation will contrast these issues and suggest an approach that trades the time normally spent on the chromatographic step for MS/MS acquisition time and interrogation of the analyte.

### **High Throughput Screening Applications for Microbial Functional Genomics**

Gerben J. Zylstra, Hung-Kuang Chang, and Maria Cruz

Biotech Center, Rutgers University, New Brunswick, NJ 08901

High throughput approaches are rapidly supplanting the more traditional hands on techniques in microbial investigations. Our laboratory has taken advantage of the new high throughput screening facility in the Biotech Center at Rutgers University to speed up the search for genes involved in the degradation of several aromatic and aliphatic compounds. Automated equipment for such labor intensive tasks as colony picking, plate replication, plasmid preparation, liquid handling, and PCR (and sequencing) reaction set up and analysis can be utilized to allow the rapid identification and characterization of target genes. For instance, automated colony pickers are capable of picking up to 3,000 colonies per hour from petri dishes into 96 or 384 well microtitre plates. Automated replication devices can replicate a microtitre plate into several daughter screening plates in only a few minutes. Automated liquid handlers can perform thousands of assays per day on bacterial or clone libraries and on purified proteins or crude cell extracts. Plasmid isolations can be performed in 96 well format with additional plates of cells queued for automatic retrieval and processing. Sequencing reactions can be performed in microtitre plates and automatically processed by automated capillary DNA sequences.

The use of plasposons (plasmid transposons) coupled with high throughput screening and genomic analyses have allowed the investigation of several routes of aromatic metabolism in *Burkholderia cepacia*. Mutants have been constructed in various steps of the phthalate, tryptophan, phenylalanine, and tyrosine catabolic pathways. Sequence identification of the plasposon insertion points revealed modifications of these catabolic pathways compared to other organisms. For instance, the *B. cepacia* genome possesses a three component anthranilate dioxygenase involved in tryptophan degradation while *Acinetobacter*, *Pseudomonas putida*, and *P. aeruginosa* have well characterized two-component dioxygenases. Some *B. cepacia* strains possess two transport systems for phthalate degradation. *B. cepacia* also degrades phenylalanine through phenylacetate while many other organisms degrade phenylalanine by simple hydroxylation to tyrosine with further degradation through the almost universal gentisate pathway.

### **Advanced Catalyst Technologies at ExxonMobil**

J. S. Beck, Catalyst Technology Laboratory, ExxonMobil Research and Engineering Co

The merger of Exxon and Mobil, now more than four years old, has brought together two long and successful heritages in the discovery and commercial application of catalytic materials. We will begin by describing today's ExxonMobil catalysis community and its broad focus on synthesis and commercial application of zeolite and metal oxide catalysts. We will discuss how we design these materials to meet the challenges facing the

petroleum and petrochemical industries particularly the manufacture of higher quality fuels, lubricants and chemicals.

Zeolites are used to accomplish molecular rearrangements with high specificity, thereby reducing operating costs and the dependence on hardware. These transformations are achieved by closely matching zeolite structure with reactant and/or resulting product molecule size and geometry. During the past several years we have used this concept to create "designer" zeolites, capable of shape-selective production of high-value products such as world class lubricants. We will illustrate the application of "designer" zeolites with some recent commercial examples.

Metal oxide catalysts are catalysts used in important refining process such as Hydroprocessing to remove natural impurities, improve product quality and reduce boiling point. Our 44 refineries have nearly 80 million pounds of metal oxide catalysts installed. Our knowledge of how metals and their oxide or sulfide counterparts work on these catalysts allows us to tailor them to selectively do the types of chemistry required. We will describe recent advances in metal oxide catalysts that are used in critical refinery processes such as the manufacture of low sulfur fuels.

ExxonMobil's strength in discovery and development of zeolite and metal oxide catalysts is a core competency and is unsurpassed in the industry. We have a full "pipeline" of catalyst capability that we are applying to impact every area of our business.

In order to accelerate the pace of catalyst innovation, ExxonMobil is exploiting the use of high throughput experimentation (HTE) to more rapidly discover and implement new catalyst technologies that are critical for future advances. To this end, ExxonMobil Research and Engineering Company (EMRE) and Symyx Technologies, Inc. (Symyx), have entered into a technology alliance focused on using high throughput experimentation (HTE) to enhance downstream and chemicals R&D activities.

### **High-Throughput Synthesis: Impact on Drug Discovery and Beyond**

Brian McKittrick, Schering-Plough Research Institute, Kenilworth, NJ

The way in which combinatorial chemistry and other high-throughput synthesis procedures have been used in drug discovery has evolved substantially over the past 15 years. This presentation will focus on our use of solid phase synthesis for lead optimization efforts and how the early success from this work led us to prepare numerous target focused libraries for lead discovery.

### **Career Path in a Corporate Setting**

Helen Han Hsu, Johnson & Johnson Pharmaceutical R&D

As Corporate is moving toward a flatter organization, it is becoming increasingly important to manage one's own career development path. The advancement within Corporate can be categorized into scientific or managerial ladders. It is critical that when one sets the development plan, he/she takes the following factors into consideration: strength, weakness, aptitude and etc. The career plan should be reviewed on both a

short-term and long-term basis. Don't be afraid to deviate from original plans, rather, be adventurous and realistic. Lateral moves can often provide long-term benefits.

## **Acknowledgements**

### **CACS Acknowledge the Following Co-Sponsors and Vendors for Their Contributions to CACS and Its Annual Symposium**

- Rutgers University
- ExxonMobil Research and Engineering Company
- Exxon Mobil Foundation (Volunteer Involvement Program)
- Schering Plough Research Institute
- Wyeth
- Chemspeed
- Advion Biosciences, Inc
- Synergetica
- Quest Pharmaceutical Services
- P.M.I Wellness
- Mass Mutual
- NexMed
- MNC Pharmaceutical Group, Inc.