# CINTACS

Newsletter of the Cincinnati Section of the American Chemical Society

March, 2004
Vol. 41, No. 6

## Meeting Calendar

| | |
|---|---|
| **Wed., March 24** | Don Tomalia at Miami University |
| **Thurs. Apr. 22** | Arthur Ford, USGS at NKU |
| **Fri. May 21** | Party Night! Melting Pot Restaurant |

## In this issue



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# March Monthly Meeting

***Nanotechnology: The Role of Dendrimers in the New Frontier***

Donald A. Tomalia, Ph.D.
Dendritic NanoTechnologies Inc.
Central Michigan University
Mt. Pleasant, MI 48558

**Abstract**

Nanotechnology is a term used to describe the science of incredibly small objects, structures and processes. These entities and events involve dimensions of $10^{-9}$ to $10^{-7}$ meters (i.e., 1 to 100 nanometers). A typical dimension of 10 nanometers (nm) is 1,000 times smaller than the diameter of a human hair. In fact, most traditional micellular and liposomal assemblies possess these dimensions and offer a "grand palette" of nanoscale architectures and behavior. Many unique, new biological materials and electronic properties are found at this dimensional length scale.

*(Continued on page 5)*

**About the Speaker**

Dr. Tomalia received his B.A. in chemistry from the University of Michigan and while at the Dow Chemical Company (1962-1990) completed his Ph.D. in physical-organic chemistry from Michigan State University (1968) under the mentorship of Professor Harold Hart. His discovery of the cationic polymerization of 2-oxazolines led to international industrial research awards (R&D – 100) for creative research in 1978 and 1986. His discovery of dendrimers (dendritic architecture) in 1979 led to a third R&D –100 Award in 1991 and the Leonardo da Vinci Award (Paris, France) in 1996. He has recently received the Society of Polymer Science Japan (SPSJ) Award for Outstanding Achievement in Polymer Science (2003).

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**THE CINTACS NEWSLETTER**

**Vol. 41, No. 6 March, 2004**

Editor.....Bruce S. Ault
Advertising.....….…..Ed Hunter

CINTACS is published eight times a year (October through May) by the Cincinnati Section of the American Chemical Society. The submission deadline will be approximately April 2 for the May, 2004 issue. Electronic submission is strongly preferred, except for original photos. All materials should be sent to:

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## from the Chair

Well over a year ago, Gil Pacey and Jim Hershberger proposed that we hold a spring, 2004, meeting of the Section at the Miami University Art Museum, in conjunction with a nanotechnology art exhibit at the Museum. This was the genesis of our March meeting.

In addition to special access to the MU Art Museum exhibit of nanotechnology images portrayed as art (part of the Miami University Nanotechnology Initiative), we will feature as our speaker Dr. Don Tomalia of Dendritic NanoTechnologies, Inc. Dr. Tomalia is acknowledged as the father of dendridic polymers—arbor-like structures with continuously branching chains extending out from a core. With their precise nanoscale dimensions, shapes, and chemical functionality, dendrimers show great promise for a wide variety of nanotechnological applications. Dr. Tomalia is a dynamic speaker with a great story to tell; I urge you to join us at Miami University on March 24 for nanotech education and fun.

Please also note that the Computational Chemistry Discussion Group will host Dr. John McKelvey before the meeting, and we will have a Board of Directors meeting at 6:00 pm at the Art Museum.

The sponsor for the March meeting is Marshall Wilson, Professor of Chemistry at the University of Cincinnati. (It's ironic that a UC professor is sponsoring our annual meeting at Miami University.) We thank Marshall for his generous contribution to the Section for this meeting.

As you will see on p. 7 of this issue, the Section has started a Long-Range Planning Committee, chaired by Edlyn Simmons (Second Vice Chair of the Section). A goal of putting together this committee is to retain the institutional memory of those who have served as chairs (and in other capacities) of the Section and have a perspective on what we want to retain and improve upon from previous years. If you have suggestions on what you would like the Section to emphasize in the future, please contact Edlyn at simmons.es@pg.com.

Along these same lines, Phil Christenson, next year's Section chair, is putting together the 2004-2005 program. It isn't too late to contact him (phil.christenson@givaudan.com) with any ideas for speakers, venues, etc.

Finally, you will soon be receiving ballots for the election of Section officers for next year. The Cincinnati Section traditionally draws a higher percentage of members voting in our elections than others our size, but we can—and should—improve on our electoral participation. PLEASE TAKE THE TIME TO CAST YOUR BALLOT THIS YEAR!

Joel Shulman

# March Monthly Meeting
# Wednesday, March 24, 2004

## Miami University Art Museum
## 801 S. Patterson (US27)
## Oxford, Ohio

## Sponsored by Professor R. Marshall Wilson

*Featuring Dr. Donald A. Tomalia*

**Program**

| | | |
|---|---|---|
| 6:00 - 6:45 pm | Discussion Group Meeting<br>Board of Directors Meeting | (Miami University Art Museum)<br>(Miami University Art Museum) |
| 6:30 - 8:00 pm | Registration and Social Hour | Special Access to the Exhibition<br>(Miami University Art Museum) |

Substantial hors d'oeuvres, Wine/beer/soft drink bar

Cost: $15.00 ($8.00 students, emeritus, unemployed and new members). Registration includes a ticket for one complimentary alcoholic beverage. Additional alcoholic beverage available on a cash basis.

8:00 - 9:00 pm Meeting and Featured Speaker
Dr. Donald A. Tomalia
Nanotechnology: The Role of Dendrimers in the New Frontier

**Dinner Reservations:** The meeting reservation form is online at http://www.che.uc.edu/acs/cinacs.html. This is the best and easiest way to register. As a lesser alternative, you may send your reservations by email to kim.carey@uc.edu. If it is absolutely impossible for you to make reservation via the internet, call 513-556-0293 (please leave name, affiliation, a contact phone number and state if you are in one of the ½ price categories). Deadline for reservations is Friday, March 19, at 5:00 pm.

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**Directions:** The Miami University Art Museum is located at 801 S. Patterson (US27). If you are driving from Cincinnati north on US27, take the first drive on the right just north of the intersection of US27 and Chestnut Avenue (see map on page ). Parking at the Museum is free.

# Computational Chemistry Discussion Group

*Predicting the Light Absorption Spectra of Large Conjugated Systems: Advancing the State-of-the-Art*

John M. McKelvey, Ph.D.
McKelvey Computational Chemistry

**Abstract**

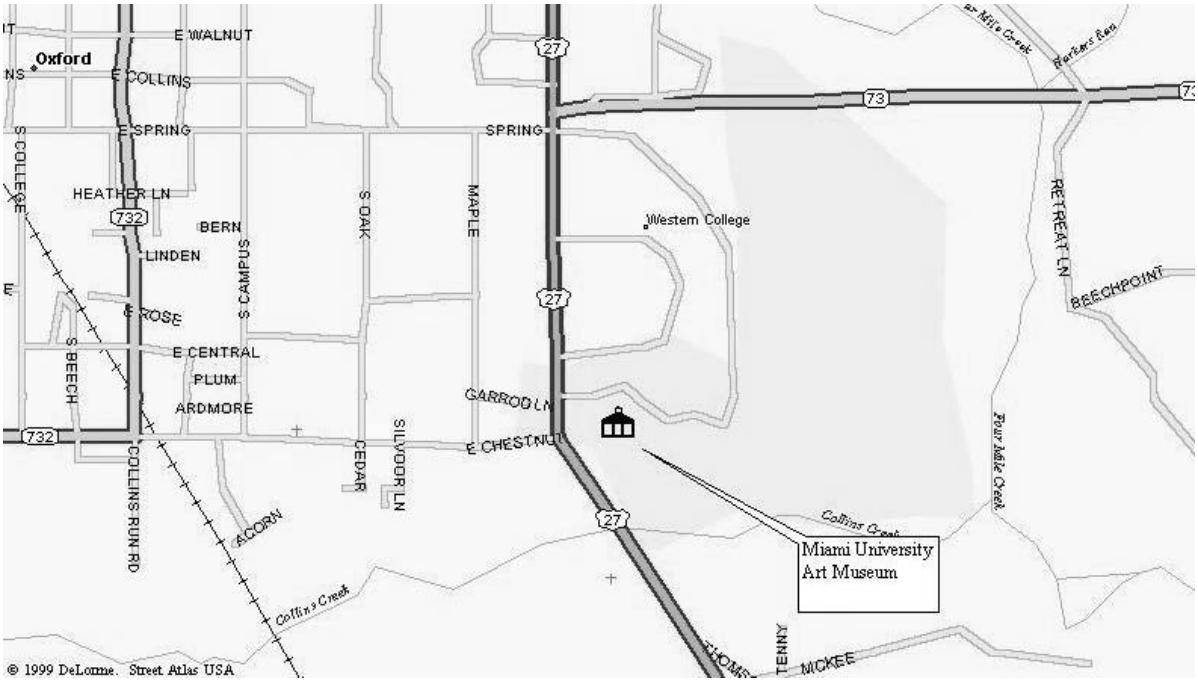
New methods for predicting light absorbing properties are between 500 and 10,000 times faster than previous ones. This talk will present an introduction to methods that have been used for computing such properties. It will describe past, current and the new methods for predicting UV-VIS properties of extended conjugated molecules. The requirements for obtaining dependable results will be given. Examples will be presented that show how new, highly efficient approaches can give high accuracy using only modest computing hardware. Applications related to imaging and photography will be given.

**About the Discussion Group Leader**

Dr. John McKelvey is a distinquished quantum chemist now heading McKelvey Computational Chemistry, a consulting and contract research firm in the greater Indianapolis area. He is a pioneer in industrial molecular modeling with a 23+ year career at the Eastman Kodak Company (retired 1998). While at Kodak, Dr. McKelvey was instumental in developing and applying computational techniques for predicting the color and intensity of dyes.

Knowledgable with all practical levels of theory from molecular mechanics through ab initio density functional theory, he is best known for his work in the semiempirical quantum chemistry area particularly with ZINDO, Prof. Mike Zerner's popular spectral calculation program (Dr. McKelvey is a coauthor of the program and a leader in the application and validation of this technology for spectral prediction). He is also coauthor of the MMX force-field in the commercial PC modeling package PCMODEL from Serena Software.

Dr. McKelvey is active in the American Chemical Society serving as National Program Chair for Computers in Chemistry. Dr. McKelvey received his Ph.D. in Physical Chemistry from Georgia Tech and switched to theory as a post-doctoral fellow, first at the Ecole Normale Superieur des Jeunnes Filles working with Prof. Gaston Berthier and second at UC Berkeley with Prof. Andrew Streitwieser.



*(Continued from page 1)*

The biological world is rich with nanoscale structures and events. Several such well known structures include: proteins/antibodies (3-15 nm), DNA (2.4 nm) and viruses (30-100 nm). A typical immunological response, involving an antibody and a pathogen (disease), is a nanoscale event involving less than 100 sq. nm of surface area. On the other hand, DNA may be viewed as a nanoscale information storage and retrieval system that defines and expresses proteins. Proteins enjoy multiple roles as precise biological building blocks and functional agents of nano-dimensions and shapes that in many cases determine either a state of health or disease.

This lecture will overview the implications of nanobiology, nanomaterials and nanoarchitectural rules and relations that govern exciting new behaviors observed in this size regime. The role of "dendrimers" as fundamental synthetic building blocks for the creation of new nanodevices suitable for applications in these areas will be introduced. Dendrimers have been referred to as "*artificial proteins*". As such, their precise nanoscale dimensions, shapes and chemical functionality have been used in prototypes suitable for targeting disease sites, controlled delivery of therapeutic/genetic or cosmoceutical materials, as well as a variety of imaging \diagnostic and personal care nanodevices.

With the drive for smaller computer chips, the quest for new properties and the implications of understanding disease and the human condition at this new dimensional level, nanotechnology has been described as the critical new science which is expected to lead to the "Next Industrial Revolution."

*(Continued from page 1)*

In 1990, he joined the Michigan Molecular Institute (MMI) as Professor and Director of Nanoscale Chemistry & Architecture (1990-99). He co-founded Dendritech, Inc. the first commercial producer of dendrimers and was named founding President and Chief Scientist (1992-2000). He became V.P. of Technology for MMI (1998-2000) while simultaneously serving as Scientific Director for the Biologic Nanotechnology Center, University Michigan Medical School (1998-2000).

Dr. Tomalia founded Dendritic Nanotechnologies, Inc. in a joint venture with Starpharma Pooled Development (Melbourne, Australia) (2002). He serves as President and C.T.O. of this dendrimer-based nanotechnology company with production and laboratory facilities located at Central Michigan University, Mt. Pleasant, Michigan. Dr. Tomalia was recently appointed director of the National Center for Dendrimer Based Nanotechnology located on the Central Michigan Campus (2003). Other positions currently held by Dr. Tomalia include *Distinguished Visiting Professor* (Columbia University) and *Distinguished Research Scientist/Professor* (Central Michigan University).

He is listed as the inventor of over 110 U.S. patents and is author/coauthor of more than 185 peer reviewed publications. Over 155 papers are focused in the dendrimer/dendritic polymer field, including a monograph entitled *"Dendrimers and Other Dendritic Polymers"* (J. Wiley) co-edited with J.M.J. Fréchet (2001). Dr. Tomalia serves on the editorial advisory boards of *Bioconjugate Chemistry* (1999-) and *NanoLetters* (2000-).

# Cincinnati Section Meeting Sponsors 2003-2004 Program Year

October 10: University of Cincinnati, Department of Chemistry
November 12: Advanced Testing Laboratory
December 10: Procter and Gamble Pharmaceuticals
January 14: The Procter and Gamble Company
February 25: Givaudan Flavors
March 24: Marshall Wilson
April 22: Robert Laughlin
May 21: Rick Fayter

**Visit the Section's Home Page**

**http://www.che.uc.edu/acs**

# 2003-04 Cincinnati Section's Chemistry Week Poster Contest Winners

***"Earth's Atmosphere and Beyond"***

The local Cincinnati Section of the American Chemical Society has once again sponsored a chemistry contest as a part of National Chemistry Week. This year the contest was based on the "Earth's Atmosphere and Beyond". The challenge was to draw a poster illustrating contributions made by chemists to the advancement of aviation and atmosphere chemistry. The local ACS section elementary contest committee has selected one winner from each grade category K-2nd, 3rd-5th, 6th -8th and 9th-12th. Here are the winners of the local Cincinnati Section of the National American Chemical Society

| | | | | |
|---|---|---|---|---|
| **Winners** | Sydney Burris | Kelcey Clinebell | Lamarco Branham | Anna Porembka |
| **Grade Level** | second | fifth | sixth | tenth |
| **Represented School** | Taylor Mill Elementary | Taylor Mill Elementary | Hays Elementary | Cincinnati Hills Christian Academy |
| **Teachers** | Mrs. Pike | Mr. Ward | Mrs. Harden | Mrs. Criniti |
| **School phone** | 859-356-2566 | 859-356-2566 | 513-363-1000 | 513-398-0393 |
| **Location** | Covington, KY | Covington, KY | Cincinnati OH | Cincinnati OH |

***Entries were judged based upon:***

- Originality and Creativity
- Relevance to and incorporation of theme
- Visual Impact and Neatness

Winners of the Cincinnati Section of the ACS along with their teachers and parents will be honored as guests of our local section's dinner meeting in April 2004, at Northern Kentucky University. The Cincinnati Section ACS has submitted the local winning poster in each of the four grade categories to the National ACS Office of Community Activities in Washington, DC. All of these winning posters will be displayed during the 227th ACS national meeting in Anaheim, CA March 28-April 1, 2004. One winner and one honorable mention will be selected for each grade category during the Anaheim ACS meeting for national recognition and prizes.

- National Winners will be awarded a handheld color TV
- National Honorable Mentions will receive a Set of Talk About 2-Way Radios
- Teachers of National Winning Students will be awarded a Periodic Table of the Elephants Poster.

To keep with the theme, participants were encouraged to consider using topics such as the following:

| | | |
|---|---|---|
| How the Atmosphere protects Earth | Aircraft: Past and Present | Space Suits: Then and Now |
| Spacecraft Materials | Layers of the Atmosphere | Emission Sources |
| Weather | Energy Efficiency | The Ozone Layer |
| Precipitation | Astronauts | Satellites |
| Respiration: Plants and Animals | Balloons | Pilots |
| Air | Keeping the Atmosphere Healthy | The Sky |
| The Solar System | Stars | Clouds and Fog |
| Rainbows | Things that Fly | Space Travel |

*Educators, thank you for encouraging your students to participate in this contest. No one ever stands so tall…as when they stoop…to help a child.*

# Dear Colleagues in the Chemical Community:

As you may be aware, there have been many changes occurring at UC. One of these is the end of Evening College and the movement of evening classes into the respective Colleges. A side effect of this is that all classes have to "make money", there is no subsidy or state funding for these classes. Under the current circumstances the minimum class size for a "self supporting" graduate class is somewhere from 5-7, depending on pay scale and whether any of the students have some form of tuition remission. In the past decade or so the Department has made up any shortfall. This is no longer possible. For over a quarter of a century the Evening program has provided a path to M.S. and Ph.D. degrees for part time students. Given the decreasing size of the enrolments and the fiscal situation, it is very likely that we will be dropping all but the Biochemistry courses. What I am trying to do with this announcement is to get a feeling as to how many people in the community feel that it is important to try to preserve this program. I would be interested in your views and I can be reached at

Ridgwath@uc.edu

PLEASE use this address, not some other one that you think may work (it probably would go to a poor guy in the UC IT office who is REALLY tired of getting my email).

Tom Ridgway
Director of Graduate Studies,
Department of Chemistry
University of Cincinnati

# Cincinnati Section Long Range Planning Committee

The Cincinnati ACS Section Long Range Planning Committee had its kickoff meeting prior to the Section meeting on January 14, 2004. The committee, chaired by Edlyn Simmons, Second Vice Chair, consists of past chairs of the section. Our objective is to make plans for the future of the Section in light of the institutional memory of those who served the organization in the past. Goals are to create goals for the future of the Section, to plan activities that will benefit the members and the community and to position the activities so as to increase recognition of the Section at the National ACS ChemLuminary Awards, and to strengthen the organization by reviewing and possibly updating the Bylaws and committee structure.

If you're a past chair who hasn't been contacted about the committee, you're welcome to join. If you're a former officer or committee chair, your input is welcome. One specific project is to create up-to-date job manuals for officers and committee chairs. If you have any old Cincinnati Section role descriptions, we'd love to see them.

Edlyn Simmons
Second Vice Chair
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simmons.es@pg.com

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**The Continuing Education Committee is pleased to bring to Cincinnati the widely acclaimed 3-day course that teaches how chemistry is used in this dynamic field …**

# Pharmacology for Chemists

**Joseph G. Cannon, Emeritus Professor of Medicinal Chemistry, University of Iowa**

**Wednesday through Friday, May 26-28, 2004**
**Holiday Inn I-275 North, 3855 Hauck Road, Cincinnati (Sharonville), Ohio**

**How You'll Benefit from This Course**

- Consult with a leading authority about your research concerns
- Master the language and terminology of pharmacology
- Learn how chemistry can be used to study a drug's mechanisms of action
- Understand the chemistry behind the drugs used for therapy
- Understand pharmacological principles and how the chemical sciences impinge upon pharmacology research
- Improve your ability as a chemical scientist to interact with pharmacologists in research pursuits
- Be exposed to the status of contemporary pharmacologic thought and drug therapy-where progress is being made and where advances will likely be made

**About the Instructor**

Joseph G. Cannon, Emeritus Professor of Medicinal Chemistry, University of Iowa, is the author or co-author of more than 200 articles in organic chemistry, medicinal chemistry, and pharmacology. He is one of the highest rated instructors in the ACS Continuing Education program and is the recipient of the Smissman-Bristol-Myers-Squibb Award sponsored by the ACS Division of Medicinal Chemistry.

**General Concepts and Principles of Pharmacology**

Definitions
Survey of appropriate literature of pharmacology
Membrane models, ion channels, structure of liquid water, implications to pharmacology
Absorption and distribution of drugs: active and passive transport
Blood-brain barrier
Drug metabolism, storage, and excretion
Enzyme induction
Drug-receptor interactions
Theories of drug activity
Introduction to pharmacokinetics

**Nervous System**

**Anatomy and physiology of the nervous system**
**Nerve impulse transmission**
**Autonomic nervous system**
Autonomic physiology and pharmacology
Noradrenergic system: receptors, agonists, antagonists, mixed acting drugs
Dopaminergic system: physiology, Parkinsonian syndrome
Cholinergic system: receptors, agonists, antagonists, acetylcholinesterase inhibitors, Alzheimer's syndrome, other forms of cognitive dysfunction
**Central nervous system drugs**
Definitions
Aspects of CNS anatomy and physiology

*(Continued on page 11)*

## CAREER SERVICES

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Seeking New Opportunities?
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For more information, visit the career services website at:

**http://www.che.uc.edu/acs/career.html**

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Neurotransmitters and receptors
Antidepressants
Antianxiety agents
Mood stabilization
Antipsychotics
Sedatives and related agents

**Analgesics and related agents**
Definitions, testing methods
Placebo effect
Antiinflammatory analgesics: the inflam matory response, role of prostaglandins, survey of drugs in this category
**"**Coal tar" analgesics, possible mechanisms of action, metabolic aspects, toxicity
Opioid analgesics-survey of chemical types, "MPTP," receptors, mechanisms of actions, endogenous peptide analgesics

**Cardiovascular Agents**
Aspects of cardiovascular anatomy and physiology
Hypertension
Physiology of blood pressure regulation
Renin/angiotensin system
Antihypertensive drugs: physiology and pharmacology
Arrhythmias
Aspects of physiology
Agents used: pharmacological mechanisms
Physiology of muscle fiber contraction
Ion channels
Myocardial ischemia (angina pectoris)
Physiological aspects
Drugs employed

**The course fee will be $800 (ACS me m-bers) and $900 (non-ACS members)** and includes all course materials, continental breakfast, lunch, refres h-ment breaks for all 3 days **(compare to $1,345 and $1,445 at ACS National meeting or Pittcon)**. Please call Rick White at 513-622-1624 to confirm your re g-istration and arrange to have check or money order (Sorry, we cannot accept credit cards) sent to**: (**Please make check payable to "Cincinnati Section ACS" **Deadline for receipt of payment is Monday, April 26).**

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