



**MONTHLY MEETINGS**

**MAY 24**

Snuffy's Restaurant  
Scotch Plains, NJ  
Keith Luker  
Pres., Randcastle Extrusion

*Microextruders and  
Nano-processing*

**JUNE 21**

Snuffy's Restaurant  
Scotch Plains, NJ  
Doug Berger  
Mng. Partner – INNOVATE LLC

*Transforming Projects in  
Breakthroughs*

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# The Chemical Consultant

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THE ASSOCIATION OF CONSULTING CHEMISTS & CHEMICAL ENGINEERS

*Scientific, Engineering, Business & Management Consultants*

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## **ABOUT THE ASSOCIATION**

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The Association of Consulting Chemists & Chemical Engineers (ACC&CE) is a network of senior-level consultants with a broad range of functional expertise and many years of experience in the chemical and allied industries. The purposes of the organization are:

- To furnish support to its members as they conduct their consulting practices.
- To offer prospective clients a “clearing house” which they can use to find the most qualified consultants or team of consultants whatever their particular problem may be.

This newsletter is intended to support those purposes as well as to educate prospective new members and prospective client organizations about ACC&CE, and how we can be most helpful to them.

The ACC&CE has an interactive website – [www.chemconsult.org](http://www.chemconsult.org), that allows prospective clients either to input their problem or to search for those consultants most skilled in their area of concern. This website also allows prospective members to access information on the organization, including back-issues of the newsletter, meeting notices, etc. It also obviously serves as a resource for the Association's members, including allowing each member to have his/her own webpage, which benefits from the visibility of the entire ACC&CE website.

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## **IN THIS ISSUE**

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We recognize that many of our members and readers are located too far from the North New Jersey - New York City area to attend our dinner meetings, which include interesting talks by guest speakers. Therefore, one of the features we are starting with this issue is reports on the talks given at our meetings. In this issue, we will cover our February talk by Innocentive. In our next issue, we plan to include descriptions of more recent presentations.

In a recent Chemical & Engineering News issue, one of our members, Dr. David Manuta, wrote an interesting letter to the editor of C&EN, and we have reproduced that letter in full.

Another feature we are starting are description by our members of interesting or challenging consulting assignments they have carried out. We hope this will illustrate to our prospective clients the breadth of experience and expertise that is available within our organization. Finally, we continue to include descriptions of our new members who have joined us since the last newsletter was published.

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# Innocentive Chief Science Officer Speaks on New R&D Approach at the ACC&CE February Meeting

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**By William Hoffman, Vice President  
Association of Consulting Chemists & Chemical Engineers  
February 2005**

At our February meeting we had the pleasure of attending a presentation of the history, background and business model for Innocentive, a novel R&D modality that has been operating solely on the Internet since June 2001. Originally an offshoot of Eli Lilly envisioned as a way to obtain outside help on synthesis problems, it remains a wholly-owned subsidiary of Lilly, but has branched and expanded to encompass problems from multiple aspects of chemistry and biology, and now has a client base (called Seekers in Innocentive-speak) of over 30 companies, many of whom are household words (Dow, Proctor&Gamble) and others well-known to most of us. No doubt the third that prefer to remain completely anonymous would be recognizable if Innocentive were permitted to reveal their names.

Secrecy has been partly removed on a couple of the earliest projects so the details of both the presentation and the solution process could be presented at the talk. It was quite interesting to me to see a widely known 4-step synthesis of hydroxyphenylbutyric acid reduced to 2 steps in the first example, but it was equally interesting to learn that the solution was iteratively attained, with the Solver providing first one approach, then another, and finally the winning one, all the while interacting with the Seeker through Innocentive. And this was one of the "reduction to practice" problems, where a sample of material is required, along with a detailed process description that can be checked.

These days, there are projects of two types, "reduction..." as just mentioned and "theoretical" or what were originally called "paper" projects. In these cases, the Solver is expected to present a proposal that has testable elements, and is well-supported by literature, but which has not been fully solved. In the "reduction" projects, the material in hand is evidence that the product required has been made, and the success of the process in the Seeker's hands is the remaining evidence, while for the "theoretical" projects, there is a larger judgement factor on the Seeker's part, and such solutions are very dependent on attention to the details of the project.

Seekers pay for access to the Innocentive virtual R&D cadre of about 80,000 worldwide, and pay successful Solvers for the solutions, along with an additional fee to Innocentive for the solution. This keeps things in balance in a system where people I've talked to wonder if the Seeker gets "free" answers by keeping the information but not acknowledging its utility. Not likely, in fact darned unlikely, is my best guess, because the Innocentive Scientific team works closely with the Seekers to define the problems presented and have a solid basis for knowing when an answer from the Solver is spot-on, or at least worth a detailed explanation for rejection by the Seeker. And the bonus for a successful submission is there.

All in all, it was a good night to eat at Sheffield's and listen to the presentation and following Q's&A's of a relatively new way to conduct R&D - a kind of outsourcing that makes sense to me, and that we can all take part in just by visiting the site and signing up. Check it out <http://www.innocentive.com>. Tell 'em Bill sent you.

Bill

## A MEMBER SPEAKS OUT

Rudy Baum, Editor-in-chief of Chemical & Engineering News wrote an editorial on "Disturbing Trends" for the October 11, 2004 issue, which started a chain of correspondence leading to the letter from Dr. David M. Manuta, ACC&CE Member No. 882. Subsequently, there were a number of responses from academics and industrial chemists (DuPont) that were published in the November 8, 2004 issue. In the opinion of Manuta, the consulting perspective was ignored in the original editorial and in the responses. This led to the writing of the letter to the editor that follows, entitled "A consulting chemist's perspectives", and reproduced below in full with authorization of the writer. The letter appeared in the February 21, 2005 issue of C&EN.

I read with great interest your editorial "Disturbing Trends" (C&EN, Oct. 11, 2004, page 5) as well as the follow-up editorial, "A Radical Notion" (C&EN, Nov. 8, 2004, page 5), and the many responses to "Disturbing Trends" in that issue. My perspective is very different from those in academia, government, and industry. As a consulting chemist, my interactions are with others who count on my knowledge and experience to set matters straight.

Viewed from the perspective of the expert witness and fire investigator, these are exciting times to be a chemist. My clients include attorneys, insurance companies, and lay individuals. The media has created such a negative connotation of chemicals and chemistry that my first task with virtually all clients is to perform "Science 101"-- establishing the facts in the case and then applying fundamental principles. Client attorneys appreciate this tack; opposing counsels generally don't. I have encountered opposing lawyers who actually try to invent science and have seen some of them unwittingly sound like stand-up comedians. The value of chemical literacy cannot be overstated.

I have worked on many cases where applications of simple safety rules would have prevented explosions, fires, or releases of hazardous materials.

Occasionally I work on defense cases. In a recent murder case, my team did both a "CSI" and a "Matlock" for my attorney client. A review of the crime lab data indicated that the defendant didn't have powder residue (the metal components of the primer compounds that ignite the gunpowder) on his person. Further examination indicated that another person present at the scene had detectable powder residue on his person. I used a dry erase board to walk the

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## **A MEMBER SPEAKS OUT - Continued**

jury through the forensic evidence. The defendant was acquitted after three hours of jury deliberation. In a case involving the use of cryogenic gases to keep electronic components cold in a military application, I learned that an impurity gas had a negative Joule-Thomson coefficient. The net effect was a boiling point depression that adversely affected an important system. When I explained that the impurity gas had to be removed at the supplier's facility, the key cause of the failure mechanism was identified and eliminated.

I have worked on cases with medical professionals. An M.D. can indicate that a certain chemical must be responsible for a condition; my task is to determine how realistic it is for that chemical to form. I go through the underlying chemistry, and in most instances, I am able to deduce a plausible pathway. In multiple expert cases, the whole can be greater than the sum of the parts.

The cases that I work on have stretched me in chemistry, engineering, and physics. No two cases are identical. In addition to knowledge and experience, complete honesty and objectivity are also required. Integrity and reputation are essential in my business.

When I visit college campuses, I make it a point to meet with students. There is a reason why one needs to take the heavy load of lab and lecture courses. Without such fundamental knowledge at one's fingertips, those who try to invent science can create outcomes not supported by the facts.

As the debate over changes in chemistry curricula at our universities continues, it is the real-world science that should drive what is taught. Students and faculty are likely to benefit when the chemistry curriculum meets this real-world criterion.

David M. Manuta  
Waverly, Ohio

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## NEW MEMBER INFORMATION

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Dr. Mark J. Blackman has almost forty years experience in the fields of analytical, chemical and medical instrumentation; mathematics; computer science and both traditional or digital photographic and imaging methods. He has participated in the development and support of new technologies and advanced applications of existing ones. He is available to educational institutions and companies requiring design, service and calibration support for most electronic and electro-mechanical equipment used in research and production operations.

### PLEASE NOTE:

For further information on the above new members and to see a complete directory of all of our members, please visit our web site: [www.chemconsult.org](http://www.chemconsult.org). A complete background of each member and his or her experience and expertise is available. Just search on the consultant's name to read his or her background information.



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## WHAT DO OUR MEMBERS DO?

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It struck us that many of our readers have no real idea of the diversity of services that our members are able to perform. In this issue we are including a few descriptions written by some of our consultants about projects that have been of particular interest. We hope that more of our members will contribute to future columns, and we certainly hope that those readers who may be prospective clients take a good look at us.

Charles Churchman,  
[jyrodyne@comcast.net](mailto:jyrodyne@comcast.net) writes:

Charlie Churchman hails from Atlanta, where he went to Georgia Tech for his B.ChE., and after two years at Berkeley, returned for graduate work. After another academic stint teaching Indians in the Canadian bush 300 miles north of Vancouver, Charlie missed MoTown, and moved back to the States, where he started working as a real ChE in 1974. Described by many as a chemical engineer's chemical engineer, Charlie has led the process design on over \$ 300 million in projects, with over \$ 50 million actually getting built. He is an AIChE fellow, and has been a sustaining member of the Atlanta chapter since the 1980's. He has worked for a number of engineering firms over the years on a wide variety of projects, from uranium extraction from phosphate fertilizers to pharmaceutical plant air pollution control. Currently he is working as Technical Director for a woman-owned small national environmental firm, working on new bioremediation techniques which use electrolytic oxygenation to replace injection of oxygen-releasing compounds, which reduces the cost of remediation by 70%. Charlie also works a new approach to energy conservation projects for a variety of industries, after all the conventional energy savings programs have been implemented, by focusing on process redesign - looking at the assumptions on

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## WHAT DO OUR MEMBERS DO? (Continued)

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Churchman – Continued

capital/energy costs made when the plant was first built. More money can be saved there than using the conventional approaches, but the risk is higher, and it takes engineers rather than bean counters to see it will work.

Bob Small ([bsmallassoc@cox.net](mailto:bsmallassoc@cox.net)) writes:

### Chemistry Challenges in the Semiconductor Industry

Gordon Moore, in 1965, observed that the number of [transistors](#) per square inch on [integrated circuits](#) had doubled every year since the integrated circuit was invented. He predicted that this trend would continue for the foreseeable future. Currently the density is doubling approximately every 18 months by reducing the size of the features on the chip.

When I first started to develop chemical cleaning solutions for the semiconductor industry, a typical Al wire line width on a computer logic chip was 0.5 micron (5000 angstroms). Cleaning chemistries might remove 50 to 100 angstroms of the metal line (1-2%) during the cleaning process with little effect on the device performance or complaints from the process engineer.

Today the semiconductor industry is preparing to manufacture devices with copper line widths of only 450 angstroms! A metal loss of 50 angstroms (11%) is completely unacceptable. The residues to be removed are poorly defined organo-metallic mixtures with Teflon-like organic residues mixed in. A difficult challenge.

Dr. Fabrizio Parodi ([fpchem@fpchem.com](mailto:fpchem@fpchem.com)), a member from Italy writes:

1. High-performance and price-competitive isocyanate-epoxy thermosetting resin systems for high-temperature structural composites and heavy-duty electrical/electromechanical devices: development of specialty rapid-curing catalysts and RTM, RIM & VIM processing protocols.

2. Chemical systems, specialty catalysts, and processing methods for the selective and fast, continuous microwave-assisted crosslinking of extruded, chemically-modified homo- or co-polyolefin bodies (pipes, hoses, cable sheaths, rods, etc.).

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4. Novel, complex isocyanate-derived polymer latexes and aqueous sizing compositions for glass fibers affording superior-performance thermoplastic polyamide-6 and -6,6 matrix composites.

5. Microwave device and process for high-throughput, continuous drying and/or post-polymerization of virgin or recycled polyester chips, powders, fragmented scraps or chopped sheets.

6. Complex, metal powder-containing thermoplastic polyolefin compounds for injection-molding, extrusion or co-extrusion manufacturing of electrically semiconducting or weakly conductive, light-weight articles or components.

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