



South Carolina Academy of Science

Vol. 34, No. 1

Newsletter

Winter, 2008

Feb. 4 2008	SCJAS Research Paper Deadline
Feb. 15 2008	Deadline for Abstract Submission and Registration for SCAS Annual Meeting
Mar. 1 2008	MESAS Mail-in Contest for Members of SCAS/ MESAS Due
Mar. 7 2008	Regional II Central SC Science and Engineering Fair - SC Fairgrounds
Mar. 19 2008	SCAS Council Meeting Clemson University
Mar. 20 2008	SCAS/SCJAS Annual Meeting Clemson University
Mar. 25-28 2008	Region III (Piedmont) Science Fair, USC Upstate
Mar. 29 2008	Region V (Lowcountry) Science Fair,
May 11-17 2008	International Science and Engineering Fair, Atlanta, GA



2008 Annual Meeting to be Held at Clemson University on Thursday, March 20 at the Hendrix Student Center

The Eighty-Second Annual Meeting of the South Carolina Academy of Science (SCAS) will be held in conjunction with the South Carolina Junior Academy of Science (SCJAS) on Thursday, March 20, 2008 at Clemson University Main Campus in Clemson, SC. More than 300 research papers will be presented throughout the day in twelve topical sessions. Registration will begin at 7:30 AM with the first presentations beginning at 8:30 AM.

Featured Research and Theme

The theme for this year's meeting is "Global Warming and Climate Change" with featured presentations by Dr. David Bodde, Senior Fellow and Professor, Arthur M. Spiro Institute for Entrepreneurial Leadership, Clemson University, and Dr. Bruce Yandle, Dean Emeritus of Clemson University's College of Business and Behavioral Science. Also highlighted at this year's meeting will be a demonstration by Dr. Karl Fletcher, International Center for Automotive Research, of hydrogen fuel cells and hydrogen powered vehicles. The title of Dr. Bodde's presentation is "Energy in the Summer of our Discontent". In his presentation, Dr. Bodde will address how the carbon-based energy systems that have served industrial civilization well for the past two centuries will be replaced by alternative sources of energy. The title of Dr. Yandle's presentation is "The Role of Social Institutions in Managing and Protecting Environmental Assets". In his presentation, Dr. Yandle will address how human communities are protecting environmental assets and the biological envelopes within which life is maintained. Dr. Fletcher will demonstrate hydrogen fuel cell technologies and will have fuel cell powered vehicles on site for exhibition.

Invited Speakers Featured at the 2008 SCAS Annual Meeting

Dr. BRUCE YANDLE - Dr. Yandle is Alumni Distinguished Professor of Economics Emeritus and Dean Emeritus of Clemson University's College of Business & Behavioral Science. Dr. Yandle is a Senior Fellow with PERC in Bozeman, Montana, Senior Fellow with Clemson's Thurmond Institute, and a Distinguished Adjunct Professor of Economics with George Mason University's Mercatus Center. He has taught in international programs in Germany, Italy, and Czech Republic and has served as a visiting faculty

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Call for Papers

South Carolina Academy of Science
2008 Annual Meeting - Thursday, March 20, 2008
Clemson University, Clemson SC

Abstract and Pre-Registration Deadline: February 15, 2008

**All abstract submissions must be entered electronically.
Abstracts may be submitted by selecting 'Abstract Submission' at:
<http://www.scacadsci.org/meetings/2008reghome.htm>**

Online registration will continue until February 15, 2008.

**After this deadline, all registration fees will only be
accepted at the Annual Meeting Registration Desk.**

The South Carolina Academy of Science invites research papers for its 2008 Annual Meeting from all scientific and mathematical disciplines. The Academy also invites papers regarding education and teaching in science and mathematics.

**The papers may be 15 minute oral presentations, including question
and answer time, or may be in poster format.**

PowerPoint presentations may only be made at all Senior Academy oral sessions. Presenters should refer to the guidelines for poster sessions and for PowerPoint presentations. The guidelines are posted on the Academy's web site at <http://www.scacadsci.org/meetings/2008amhome.htm>.

Persons wishing to present at the Annual Meeting must fill out abstract (on-line) and registration forms. Mail-in registration forms must be returned to Dr. John Safko, SCAS Treasurer, Department of Physics and Astronomy, University of South Carolina, Columbia, SC 29208 by February 15, 2008.

**** Note: Only abstracts submitted online will be accepted.**

***** For SCJAS submissions, please refer to: is
<http://www.erskine.edu/scjas/2008amhome.htm> *****

Greenville Student to compete in Discovery Channel's Discovery Young Scientist Challenge

Discovery Communications announced **Darby Woodard** from Greenville, SC as one of 40 students selected nationwide to compete in the DYSC Challenge in Washington, D.C.

The finalists were selected from the 75,000 students who entered science fairs nationwide. As an eighth grader last May, Darby entered the Greenville County and South Carolina Regional Science and Engineering Fair representing Mitchell Road Christian Academy. Her project was titled: *"Portion Distortion: Are Subtle Visual Cues Contributing to Our Expanding Waistlines?"* She was one of 15 students selected to compete in the national challenge.

In Washington, Darby and the other finalists will take part in a series of team-based, interactive scientific challenges focused on this year's environmental theme, dubbed "Operation Green." The students will compete for more than \$100,000 worth of scholarships and special prizes, as well as the title of "America's Top Young Scientist of the Year."

"We are excited that Darby was selected nationally for her science investigation and communication skills that our judges saw in her at our fair. She will be an excellent representative for Greenville and South Carolina" noted Greg Cornwell, coordinator of the science and engineering fair.



Coastal Carolina University Chemistry and Physics Science Day

Students from five high schools in Horry County and one high school in Georgetown County participated in Coastal Carolina University's first Chemistry and Physics Science Day on December 7. The event, sponsored by CCU's Department of Chemistry and Physics, is designed to encourage area high school students' involvement in science. Prior to visiting the Coastal campus, participating students took exams at their respective schools. The highest scorers in each category are:

1st Place

AP Physics: **Davy Stone** of Socastee High School

AP Chemistry: **Ahmed Jaraki** of the Scholars Academy

CP Physics: (tie) **Charles Smith** of Myrtle Beach High School and **Scott Lauigne** of Aynor High

2nd place

AP Physics: **Sam King** of Socastee High School

AP Chemistry: **David Oberst** of Georgetown High School

CP Chemistry: (tie) **Samantha Ward** and **Kathryn Teal**, both of Aynor High School

3rd Place

AP Physics: **Megan Moore** of Socastee High School

AP Chemistry: (tie) **Zachary Graham** of the Scholars Academy and **Hunter Robinson** of Socastee High School

CP Physics: **Samantha Ward** of Aynor High School

Best High School in Physics: Socastee High School

Best High School in Chemistry: The Scholars Academy

Students who participated in the program took a campus tour led by CCU physics and chemistry majors, and an awards ceremony was held to honor the top exam scorers and high schools. After the awards ceremony the students, teachers and parents were invited to stay for refreshments and to meet the chemistry and physics faculty.

Tentative Schedule -- 2008 Annual Meeting

Wednesday March 19, 2008

6:00-9:00 PM

SCAS Council Meeting and Dinner

Season's Restaurant, Madren Center

Thursday March 20, 2008

7:30 AM – 7:00 PM

SCAS Annual Meeting

Hendrix Student Center

7:30 AM – 2:00 PM

Registration, SCAS & SCJAS

Hendrix Student Center, Main Lobby

8:30 AM - 10:30 AM

SCAS Morning Presentations:

Chemistry and Biochemistry

Molecular and Cell Biology

Field Biology

Physics/Astronomy

8:30 AM – 10:30 AM

Poster Session

9:30 AM – 10:30 AM

SCJAS *Science In the News* Competition

11:00 AM

Welcome and Introduction of Keynote Speaker:

Dr. Doris Helms, Provost and Academic VP

11:10 AM

Keynote Speaker:

Dr. David Bodde, "Energy in the Summer of our Discontent"

Ballroom, Hendrix Student Center

12 Noon

SCAS Teacher of the Year and Governor's Awards Presentation

Introduction of New SCAS Council Members

12:30 PM

SCAS Business Meeting

12:30 PM – 1:30 PM

SCAS and SCJAS Lunch

1:30 PM – 3:30 PM

SCJAS Speaking of Science Competition

1:30 PM – 3:00 PM

SCAS Afternoon Presentations:

Math/Computer Science/Statistics

Geography and Geological Sciences/Nanoscience

3:10 PM - 4:00 PM

Featured Speaker (introduced by Dr. David Grigsby,

Senior Vice Provost, Clemson University)

Dr. Bruce Yandle, "The Role of Social Institutions in Managing and Protecting Our Environmental Assets"

4:00 PM – 4:30 PM

Afternoon Break

4:30 PM – 6:00 PM

Alternative Fuel and Hydrogen Fuel Cell Demonstrations:

Dr. Karl Flecher and others

6:15 PM - 7:45 PM

SCJAS Awards Banquet



FUNDS AWARDED FOR TESTING OF ANTIMICROBIAL COPPER METALS

CHARLESTON, SC — Funds to continue clinical trials for determining the antimicrobial effectiveness of copper, brass and bronze have been awarded to the Copper Development Association, announced CDA President Andrew G. Kireta Sr.

Of the two studies funded, one is focused on the ability of copper alloy surfaces to kill deadly pathogens and impede cross-contamination. The monies will be used to complete the pilot conversion of touch surfaces in healthcare facilities in New York City and Charleston, South Carolina, where extensive clinical trials have begun.

The other, which follows the same premise, is designed to demonstrate the effectiveness of copper components in heating, ventilating and air-conditioning (HVAC) systems in reducing the incidence of harmful microbes that spread throughout buildings and other indoor air environments.

The studies will be carried out for the U.S. Department of Defense under the aegis of the Telemedicine and Advanced Technologies Research Center, a section of the Army Medical Research and Materiel Command and implemented by SCRA affiliate Advanced Technology Institute (ATI). “We are confident that our outstanding program team, comprised of the US Army, the US Copper Development Association, Sloan-Kettering

Memorial, the Medical University of South Carolina, The University of South Carolina, The Veteran’s Administration, and SCRA’s ATI, will assure outcomes of both improved patient care and expanded applications and markets for copper products,” said Bill Mahoney, SCRA CEO.

Since these studies began, the increasing concern over microbial growth on common touch surfaces has moved beyond healthcare facilities and into the community. In fact, recent cases have been diagnosed in students at many schools across the country.

According to Dr. Harold Michels, vice president of Technical and Information Services for CDA and the studies’ principal investigator, “This decision allows the trials to move into the next, critical phase of study. We fully expect our work will demonstrate that the utilization of antimicrobial copper alloy surfaces will be an effective weapon in the battle against hospital and community-acquired infections and, when used in conjunction with good clinical hygiene, will help greatly to reduce the spread of certain virulent, antibiotic-resistant pathogens, such as methicillin-resistant *Staphylococcus aureus* (MRSA) and *E. coli* O157:H7.”

The clinical trials follow peer-reviewed research conducted at the University of Southampton in the United Kingdom proving copper, brass and bronze can quickly and efficiently eradicate several different pathogens which are the source of many hospital-acquired infections. Estimates from the U.S. Centers for Disease Control and Prevention (CDC) state that infections acquired in U.S. hospitals affect some two million individuals every year, resulting in nearly 100,000 deaths annually and costing the healthcare

industry some \$30 billion. It is widely believed those numbers will grow, unless more effective measures are implemented.

The touch surfaces trials will determine how well natural copper, brass and bronze surfaces mitigate infectious microbes, decrease cross-contamination and ultimately help reduce the incidence of hospital-acquired infections in patients. Rates of infection are being measured using three indicator organisms: MRSA, vancomycin resistant Enterococci (VRE) and *Acinetobacter baumannii*. The surfaces involved in the study are typically made of coated carbon steel, aluminum, stainless steel or plastic, which have little or no effect in controlling pathogens.

The studies are being conducted at Memorial Sloan-Kettering Cancer Center in New York City, the Medical University of South Carolina and the Ralph H. Johnson VA Medical Center, both in Charleston, South Carolina. Previous studies were conducted by ATS Labs in Eagan, Minnesota, under test protocols established by the U.S. Environmental Protection Agency. They show solid copper alloys are more than 99.9% effective on five pathogens commonly found in healthcare facilities. The tests have been submitted to EPA as part of a registration process to secure approval for making human health claims for the copper metals.

The companion study compares copper air-conditioning system components, including heat exchangers and drip pans, with components made of aluminum as to their ability to control the growth of harmful bacteria and fungi. The trials are designed to demonstrate the effectiveness of cop-

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5th Annual Xtreme Technology Event held at Benedict College

COLUMBIA, SC, -- Thirty-eight (38) teams of high school students competed in the Fifth Annual Xtreme Technology Event (XTE) hosted by Benedict College. The event is one of the fastest growing scientific competitions designed to expose high school students to different perspectives on the world of science, technology, engineering and mathematics. Nearly 300 high school students from South Carolina and North Carolina competed in the two day competition held November 15 and 16, 2007 at Benedict College.

"I would like to thank you and Benedict College for all you have done with putting together this exciting competition. My kids enjoyed being a guest of Benedict College and enjoyed all the competitions. They had fun and learned at the same time," said Milton Howard, Garrett Academy of Technology

Teams competed in seven (7) disciplines. These mini-projects and competitive activities were in the areas of physics, engineering, biology, chemistry, environmental science, mathematics and computer science. They were purposefully and selectively designed to challenge and advance the thinking and problem solving abilities of participating students. Each student participant received an XTE 2007 gift bag. The schools accumulating the highest overall points were awarded high tech prizes and trophies provided by our sponsors National Science Foundation, Department of Energy, SCANA, Wilbert Smith and Associates, Michelin, BMW, Apple and others. Competition results are as follows:

Overall Competition Winners

- 1st Place: Irmo High School Team A
2nd Place: White Knoll High School Team A
3rd Place: Irmo High School Team B
4th Place: Batesburg-Leesville High School

Each student received their choice of an Apple iPod Touch, a SONY PSP, an Apple (8 GB) iPod Nano, or an Apple (4 GB) iPod Nano

Discipline Awards & Schools

Physics:
White Knoll High School Team A

Chemistry:
Strom Thurman High School

Mathematics:
Irmo High School Team A

Environmental Science:
White Knoll High School Team B

Biology:
Irmo High School Team A

Computer Science:
White Knoll High School Team A

Engineering:
A.C. Flora High School Team C

On Thursday November 15, 2007, Columbia Mayor Bob Coble encouraged the participants in their scholarship. Mayor Bob spoke about the technological advances that the City of Columbia is pursuing and urged the students to continue to cultivate their enthusiasm for the sciences. On Friday, Radu Vitic, Dr. John

Weidner and Mr. Howard Lederfind of the Greater Columbia Fuel Cell Challenge demonstrated A Fuel Cell/electric hybrid Segway used by the Columbia Police Department and the Jadoo XRT, a portable Fuel Cell power Generator for emergency responders used by the Columbia Department of Homeland Security. Each presenter discussed progressive uses of fuel cell technology.

"The Xtreme Technology Event is a fun, high energy, educational opportunity for high school students to explore different areas in science, technology, engineering and mathematics. We are already looking forward to the 2008 competition" says Dr. Stacey Franklin Jones, Dean of the School of Science, Technology, Engineering and Mathematics at Benedict College.

Accommodations Information for 2008 Annual Meeting

Clemson Sleep Inn
Identify yourself as an SCAS member to get group rate of \$70 plus tax. Very nice, clean, comfortable rooms. Each includes a refrigerator and microwave. The cut off date for this rate is March 1, 2008. You must cancel 20 days prior to check-in. www.sleepinclemson.com

Comfort Inn
Rates are \$60 plus tax, if you identify yourself with group #3499 or as an SCAS member. For more information, go to www.comfortinn.com.

For up to date accommodations information, go online to:
<http://www.scacadsci.org/meetings/2008amhome.htm>

Academy News

Student Internships:

Two Coker College undergraduate students, **Lacey Parrott** and **Ashley Zearfoss**, participated in a summer research experience in my collaborators' laboratories (Drs. Jin-Rong Xu and Larry Dunkle) at Purdue University in West Lafayette, Indiana. Ashley and Lacey interacted with many international and domestic students and scientists and immersed themselves in the culture of a large research university. Their projects centered on areas of fungal genomics and plant pathology. The internships were supported by the EPSCOR- Collaborative Research Project funded to Flaherty at Coker College.

Professional Meeting:

Joseph Flaherty along with three Coker undergraduate students (**Amber Rayfield**, **Lacey Parrott**, and **Ashley Zearfoss**), attended the annual meeting of plant pathologists (American Phytopathological Society) in San Diego, CA from July 27th to August 1st. The students presented their research project titled "*Isolation of tagged insertional mutants of *Fusarium graminearum* impaired in asexual reproduction*". Their abstract was published in the journal *Phytopathology*. This meeting was attended by over 1,500 scientists in academia, government, and industry representing 45 countries.

Directions to Clemson University

From Atlanta, Ga. (approximately 128 miles)

I-85 N toward Charlotte, N.C.; take exit 19B to US-76 W to Clemson

From Charlotte, N.C. (approximately 135 miles)

I-85 S toward Atlanta, Ga.; take exit 19B to US-76 W to Clemson

From Columbia, S.C. (approximately 137 miles)

I-126 W to I-26 W toward Spartanburg, S.C.; exit I-385 W to Greenville, S.C.; exit I-85 S toward Atlanta, Ga.; take exit 19B to US-76 W to Clemson

From Jacksonville, Fla. (approximately 425 miles)

I-95 N toward Fayetteville, N.C.; exit I-26 W toward Spartanburg, S.C.; exit I-385 W toward Greenville, S.C.; exit I-85 S toward Atlanta, Ga.; take exit 19B to US-76 W to Clemson

From Asheville, N.C. (approximately 93 miles)

US-74 W to US-23 S to I-240 S to I-40 E toward Winston-Salem, N.C.; exit I-26 E toward Charleston, S.C.; exit US-25 S toward Travelers Rest; exit US-123 W toward Easley; go through Easley, on 123 to Clemson Planes and Trains

The international airport at Greenville/Spartanburg is 45 minutes (45 miles) from Clemson.

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per surfaces in reducing the colonization of HVAC systems by harmful microbes and reducing exposure to these organisms throughout the buildings served by the systems.

Laboratory studies are taking place at the University of South Carolina in the Arnold School of Public Health. Field trials will be performed at the Moncrief Army Community Hospital and barracks at Fort Jackson, the D.D. Eisenhower Army Medical Center at Fort Gordon and the United States Air Force Academy. Michels says, "The results of these real-world trials should encourage a leap forward in the design of HVAC systems and make a major contribution to the reduction of Sick Building Syndrome and the improvement of indoor air quality."

The Copper Development Association is the information, education, market and technical development arm of the copper, brass and bronze industries in the USA.

Unlocking the Mystery – Prostate Cancer Research

Dr. Bagasra Awarded Over One Million Dollars to Study Prostate Cancer in African American Men

Why are African American men, after 10 to 20 generations in the U.S., twice as likely to develop cancer of the prostate as Caucasian Americans, while South African Blacks are 10 to 30 times less likely to develop prostatic cancer than their American distant cousins and 2 to 10 times less likely than African Whites, who may be presumed to have a mixed European ancestry somewhat similar to that of White Americans? Omar Bagasra, MD, PhD and Professor of Biology, and Director of the South Carolina Center for Biotechnology at Claflin University has been the Principal Investigator in a number of major research projects awarded to Claflin University to study this phenomena. These projects include research proposals awarded by the Department of Defense, Medical Command, Congressionally Directed Medical Research Program, National Cancer Institute, INBRE, EPSCoR and National Science Foundation.

In July 2001, Dr. Bagasra arrived at Claflin University in order to start the South Carolina Center for Biotechnology, the first such center at any Historically Black College & University (HBCU) in the country. The University Board of Trustees officially approved the Center and recruitment

of faculty and the development of courses is progressing. The Center has initiated a major in Biotechnology and Bioinformatics in the 2002 academic year as well as a Masters in Biotechnology in spring of 2005.

Since his arrival at Claflin, Dr. Bagasra has expanded opportunities for clinical collaborations and molecular medicine research while expanding his leadership role in the training of young African Americans and other minorities of scientific research. Because of numerous funding awards, Claflin has been able to pursue one of Dr. Bagasra's early research efforts and answer the question, "Are there any consistent differences in the expression of significant genes or proteins in the prostate cancers taken from African Americans versus those from White Americans?" Because there is a well-documented depression in zinc levels with neoplastic conversion of normal prostate cells, the study had initially focused on the expression of genes known as zinc transporters.

The hypothesis is that the expression levels of one or more of these genes, as measured by mRNA expression may be differentially expressed in African Americans and European Americans. A study of the genes and proteins which influence the expression of any gene confirmed to be disparately expressed might lead to the identification of one or more environmental or living pattern factors worthy of epidemiological research for its potential relationship to the incidence or progression of prostate cancer in African

Americans, European Americans or other groups.

As described by Dr. Bagasra, "In this research project, it is my goal to test this hypothesis by analyzing prostate cancer tissues for the expression of mRNAs that code for various zinc transporter proteins. I and my students, post doctoral fellows, and other trainees have also developed highly sensitive assays that can measure the minuscule amount of zinc inside the prostate cancer cells and even inside the mitochondrial cells. The visualization and measurements of intracellular zinc levels and the location of zinc inside the various cell types that make up the cancer and normal prostate tissues may help us unlock the mystery that how prostate cancer start!"

Since we have good evidence that zinc transporters may play a pivotal role in the development of prostate cancer, Dr. Bagasra and his students have expanded these observations in Diabetes, Hypertension, Breast Cancer and sudden heart attacks in young African Americans. All of these illnesses affect African American in highly disproportionate levels.

Dr. Bagasra is an "elected" member of the Nominating Committee for the American Society of Cancer Research (AACR) Minority in Cancer Research Committee (MICR). He is also member of the editorial board of several journals and active reviewer for over a dozen peer-reviewed International journals.

Sample Abstract Page

REMINDER: SCJAS abstracts should NOT be submitted using this form. For SCJAS instructions, please see:
<http://www.erskine.edu/scjas/2008instructions.htm>

Select one of the topical sessions below for your presentation:

Biology : Cellular	Earth / Geological	Statistics	Nursing
Biology : Field	Geography	Public Health	Physics / Astronomy / Engineering
Biology : Molecular	Math / Computer Science / Statistics	Meteorology / Climatology	Psychology / Soc. Sc
Chemistry / Biochemistry	Math Education / Science Education / Computer Science Education	Medicine Pharmacology Pharmacy	Nanoscience

Also Mark if: SCAMP EPSCOR Two Year College

If you are a STUDENT, please check appropriate box: Undergraduate Graduate

To be considered for prizes awards, indicate the status of PRESENTER

Explorers Club for Undergraduate: Students Only (written paper to Safko (safko@sc.edu) by March 1, 2008)

Visual Aid(s) needed: Overhead Projector Computer and Computer Projector for PowerPoint.

POSTERS: Check here if your presentation is a poster presentation:

Poster Presentations REQUIRE THE ABSTRACT BELOW, a printed extended abstract to be available at the poster station, AND submission of the extended abstract in Microsoft Word format to dkferris@uscupstate.edu for inclusion in the SCAS Journal. Posters are only eligible for the Explorers Club award.

(Note: Because of time constraints, VCR/TV presentations cannot be accommodated)

*** The presenter of a paper must be registered for the meeting and one of the authors must be a member of the SCAS, but is not required to attend the meeting.

The following are required:

AUTHOR / PRESENTER WHO IS A CURRENT MEMBER OF SCAS

SCAS MEMBER ID NUMBER (LOCATED ON NEWSLETTER MAILING LABEL)

Contact Information for Head Presenter:

First Name: Last Name

E-mail:

Phone Number:

Institution / Business

Research Supervisor (if student)

NAME OF PRESENTER



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You may pay by mail with a check or online through Paypal.

Make a commitment to support the activities & goals of the South Carolina Academy of Science and become a member today!

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member at the University of Montpellier's law school. He served in Washington on two occasions, first as a senior economist on White House staff during the Ford and Carter Administrations and later as Executive Director of the Federal Trade Commission in the Reagan Administration. He has been a member and chairman of South Carolina's State Board of Economic Advisors. He is author/editor of some 15 books, including *The Economics of Environmental Quality*, *Taking the Environment Seriously*, and *Common Law and Common Sense for the Environment*. He is a director and past-president of the Association of Private Enterprise Education, a director of Responsible Resources, and a trustee of Spartanburg Methodist College. Prior to entering a career in university teaching, Dr. Yandle was in the industrial machinery business for 15 years. He writes a quarterly newsletter on the economy that is distributed by Clemson's Strom Thurmond Institute.

Dr. KARL FLECHER -- Dr. Flecher is the Associate Director of the International Center for Automotive Research in Greenville, SC. He has over 18 years of experience with BMW and other automotive companies. Dr. Flecher's expertise is in alternative fuels, and, in particular, hydrogen fuel cells and hydrogen powered cars. Most recently he consulted with BMW and Honda Motors to develop their "entry level" hydrogen powered cars.

Dr. DAVID L. BODDE -- Dr. Bodde is a Senior Fellow and Professor with the Arthur M. Spiro Institute for Entrepreneurial Leadership at Clemson University. His primary experience is in research, teaching, and consultation in: technology and strategy in the energy industries, new venture development, advanced energy technology, and corporate entrepreneurship. Dr. Bodde is the author of *The Intentional Entrepreneur* (M. E. Sharpe 2004); co-author of *The Hydrogen Economy* (National Academies Press 2004); and editor of *Managing Enterprise Risk: What the Electric Industry Experience Implies for Contemporary Business* (Elsevier 2006).



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THE SOUTH CAROLINA ACADEMY OF SCIENCE

Mission Statement

- *To promote the creation and dissemination of scientific knowledge within the state of South Carolina by stimulating scientific research and publication.
- *To improve the quality of science education in the state of South Carolina.
- *To foster the interaction of business, industry, government, education and the academic scientific community.
- *To improve public understanding and appreciation of science for its utilization in human progress.
- *To encourage young people to become involved in science through support of the Junior Academy of Science.

Visit us on the web at: www.scacadsci.org



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