

THE NATIONAL ACADEMIES

Advisers to the Nation on Science, Engineering, and Medicine

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THE RAP SHEET

A Quarterly Newsletter of the National Research Council Research Associateship Programs

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Director's Message

Over the past year, the Research Associateship Programs office has worked diligently to shorten the review cycle. The entire process now takes approximately seven weeks from the application deadline to the time when rosters of successful applicants are sent to the sponsor laboratories.

In light of the shortened review cycle, we have opted to add an additional review to our program year. Beginning now, we will have four review deadlines each year with dates of February 1, May 1, August 1 and November 1. Results from these reviews will be sent to the sponsor laboratories prior to the end of the month following the review deadline.

The advantage of an additional review, and spacing of our deadlines at 3-month intervals, is that prospective applicants will not have to wait as long for the next application deadline. It was our concern, and this was echoed by some of our Advisers, that the long time between some deadlines and the time it took for the review discouraged some of their best candidates. With these changes in place, we expect that this will no longer be an issue.

Aside from some shifting of dates, the major change in our review schedule is the addition of a late fall deadline. Several sponsors have suggested to us that this time is optimal for recruiting applicants in certain disciplines. Among the programs that will benefit from the November 1 deadline is the Summer Faculty Fellows programs administered on behalf of the Air Force and the Environmental Protection Agency. The fall deadline will assure that summer faculty are informed of their awards with sufficient lead-time to allow them to make plans for the summer well in advance.

Elsewhere in this issue of the RAP Sheet is an article on the importance of the Laboratory/Center Review in the evaluation of applications. Our review panels consider these comments by Advisers as

part of the rating process, and the success of your applicant depends, in part, on how you perceive the quality and value of the proposed research.

Advisers in the Research Associateship Programs serve as mentors to NRC Postdoctoral Associates. These interactions begin during the application process and may continue after the Associate leaves the laboratory at the end of tenure. In future issues of the RAP Sheet we will be focusing on issues of mentoring as part of the postdoctoral experience. We would be glad to hear from any of our Advisers who may wish to share their experience as a mentor in our programs.

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New on the Web Site

The NRC Research Associateship Programs Web site has recently been updated with some information on the NRC Research Associateship Programs review process (click on [REVIEW CRITERIA](#)). This information is intended to help prospective applicants understand what makes a successful application. In future issues of the RAP Sheet we will include comments from some of our panelists on reasons for success or failure of applications. These comments should be of value to Advisers when working with prospective applicants.

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New Review Schedule for 2003

Beginning in 2003, the NRC will accept applications for four annual reviews. The deadline dates for applications, due dates for receipt of completed Laboratory/Center Review forms and dates when reviews will be completed are as follows:

Application deadline:	Lab/Center Review forms due:	Review completed:
February 1	February 28	mid-March
May 1	May 19	mid-June
August 1	August 19	mid-September
November 1	November 28	early January

The NRC anticipates having electronic application submittal up and running before the February 1 deadline. The NRC will transmit the Research Proposals to the Laboratory Program Representatives as well as to the proposed Research Advisers soon after the applications are received.

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Professional Meetings

The NRC staff attends more than twenty annual meetings of professional scientific societies to disseminate information about the Associateship Programs and to recruit applicants. At each of these meetings, the NRC has an exhibit booth where we discuss the program with potential applicants. At some meetings, we also participate in the job placement centers, where we make brief presentations to small groups of potential applicants followed by question-and-answer sessions.

The meetings we will attend for the remainder of 2002-March 2003 are listed below. Look for the NRC Associateship Programs booth in the exhibit hall if you will be attending:

Society Advancement of Chicanos & Native Americans in Science	Sept 26-29	Anaheim, CA
World Space Congress American Institute Aeronautics/Astronautics	Oct 14-19	Houston, TX
Florida Education Fund/McKnight Fellows	Oct 18-20	Tampa, FL
Geological Society of America	Oct 27-30	Denver, CO
Society for Neuroscience	Nov 2-7	Orlando, FL
American Society of Tropical Medicine & Hygiene	Nov 10-14	Denver, CO
Society of Environmental Toxicology & Chemistry	Nov 17-20	Salt Lake City, UT
Materials Research Society	Dec 3-5	Boston, MA
American Geophysical Union	Dec 6-10	San Francisco, CA
American Society for Cell Biology	Dec 14-18	San Francisco, CA
American Astronomical Society	Jan 5- 9, 2003	Seattle, WA
American Institute of Aeronautics and Astronautics	Jan 6-9	Reno, NV
Society of Photo-Optical Instrumentation Engineers	Jan 28-30	San Jose, CA
American Physical Society	March 3-7	Austin, TX
Association of American Geographers	March 4-7	New Orleans, LA
Pittsburgh Conference on Analytical Chemistry/Applied Spectroscopy	March 9-14	Orlando, FL
American Chemical Society	March 24-26	New Orleans, LA

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The Laboratory/Center Review Form: An Integral Part of an Associateship application

An application for an NRC Research Associateship award consists of the following elements: the *APPLICATION* form including the *RESEARCH PROPOSAL*, a summary of *PREVIOUS AND CURRENT RESEARCH* (which includes a list of publications), academic transcripts for all applicants who have held the PhD for less than five years, *REFERENCE REPORTS*, and the *LABORATORY/CENTER REVIEW* form. Each of these documents is an important part of the application and each receives careful consideration by the NRC Panels.

As applications are received by the NRC, each applicant's *RESEARCH PROPOSAL* is copied and forwarded **along with a LABORATORY/CENTER REVIEW (LCR) form** to the individual at the laboratory who manages the NRC Research Associateship Program, the Laboratory Program Representative or LPR; the LPR in turn forwards both documents (the *RESEARCH PROPOSAL* and the *LCR*) to the proposed Research Adviser who was selected by the applicant.

While the majority of the components of the application reflect the accomplishments and thinking of the applicant, the *LABORATORY/CENTER REVIEW* form allows the prospective Adviser to communicate, to the NRC Panels, his/her evaluation of the quality and value of the proposed research. Considering the importance of the *LABORATORY/CENTER REVIEW* form in the review process, we would like to highlight how it is used and include comments from a few of our most experienced Panelists. The following are comments of our Panelists regarding how they view the *LCR* form. We hope this information will be useful to our program Advisers when completing the form.

"The evaluation of an application for an NRC Research Associate is based on the applicant's academic record, letters of reference, research accomplishments, and his/her Research Proposal. Evaluating the proposed research program is often the most instructive but difficult task for the NRC Panelist since it usually involves a highly specialized problem in a given research area. The proposed Research Adviser is generally a recognized authority in this area, and his/her evaluation of the proposal is of special importance. The Research Adviser also knows if the laboratory has the necessary resources to support the project. It is also valuable to know how the proposed research fits into the broader program of the laboratory."

"Properties of the LCR evaluation that I look for include: the significance of the proposed research for advancing scientific understanding in the field, the background and skills that the proposer brings to the research, the relevance of the research to the mission of the laboratory, and the potential for the research to yield high-impact archival publications."

"I find the Laboratory/Center Review (LCR) to be an important part of the overall evaluation of the NRC Research Associateship application. Responses on the LCR indicate the extent to which the sponsoring laboratory has carefully considered the scientific merit of the proposal, how the project and the applicant fit within the overall mission of the laboratory, and the degree of enthusiasm that the laboratory has toward mentoring the applicant. As a Panelist, I look for some indication that the responses on the LCR form reflect the goals, methodologies and specific requirements of the proposal. The Associateship experience should be mutually beneficial to both the Research Associate and the sponsoring laboratory, and the LCR should reflect this aspect of the program. Single word or cursory responses to questions about the scientific merit, feasibility, degree of innovation or relevance to the mission of the laboratory are definitely not helpful, and can even suggest a lack of commitment, interest, or enthusiasm for the project or for the applicant."

"The Laboratory/Center Review answers a number of valuable questions. First, does the laboratory believe the proposal is a valuable idea that will lead to progress in the technical subject and in the laboratory's closely related programs? The Panelist assumes this is true a priori, but it's important for the lab to say it. The question on the LCR form of "how does the proposal fit into the mission of the sponsoring agency" is closely related and is very important. This is a question that could be expanded upon in more detail by proposed Research Advisers. It would be an indication of how enthusiastic the lab is and how much that enthusiasm will translate into support, encouragement, equipment availability, etc. Second, the question on the scientific quality of the proposal is a key, especially the sub-question: is the approach sound and technically feasible? The proposed Research Adviser is the most knowledgeable person about the details of the proposal other than the applicant. If the Adviser isn't enthusiastic about the proposal and its value and technical feasibility, then no one else will be. The proposed Adviser needs to convey to the Panelists that he/she believes the proposal is innovative, creative, relatively novel, technically sound, and a valuable addition to the scientific work going on in his/her lab and going on in the scientific

community at large. Another factor that enters into the value of the LCR is hard to quantify: it's the underlying enthusiasm that's conveyed in the review. It's very apparent to the Panelists which Advisers are enthusiastic about the proposal and the applicant and which are lukewarm. Being lukewarm is a negative because it means the Adviser really doesn't care that much about the work or its relevance to the lab."

"Where the labs need to be careful is that we [the Panelists] will tend to interpret a non-informative response as a negative response. That is, if the lab gives us a detailed statement of exactly how the proposed work will fit with the lab's program and present some evidence that it is in fact feasible, then the proposal will get a higher score. On the other hand, if there is a perfunctory statement that says "yes, this is good work and we'd like to see it done," then the Panelists will interpret this as lukewarm interest in the proposal, whereas it might simply reflect haste on the part of the person [Research Adviser] filling out the form."

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Associate Awards

We will be including a section in each Newsletter highlighting awards that have been received by NRC Associates. Examples are a "best presentation" award, a travel grant, etc. Please send this information to your NRC Program Administrator or Coordinator, either directly or through your LPR. You may also email to rap@nas.edu. We look forward to highlighting the accomplishments of our Associates.

Maureen R. Gwinn, Ph.D.
NRC Postdoctoral Research Associate
NIOSH
Morgantown, WV

Dr. Gwinn was awarded a two-year grant through the CDC's Office of Women's Health along with her Adviser, Ainsely Weston. This grant is for a study on the effects of di-butyl phthalate (DBP) on gene expression of normal human mammary epithelial cells as measured by micro-arrays. DBP is found in many common personal hygiene items, with a large exposure for cosmetologists and beauticians.

Jerry Griffith, Ph.D.
NRC Postdoctoral Research Associate
EROS Data Center
U.S. Geological Survey
Sioux Falls, SD

Dr. Griffith received the award of "Best of Session" for his paper "Changes in Landscape Pattern and Land Cover in Selected Ecoregions" presented at the 3rd International Conference on Geospatial Information in Agriculture and Forestry held in Denver, Colorado, November 5-7, 2001.

Hanz Richter, Ph.D.
NRC Postdoctoral Research Associate
Propulsion Test Technology
NASA - Stennis Space Center

Stennis Space Center, MS

Dr. Richter was awarded two "Best Session Presentation" awards at the 2002 American Control Conference held in Anchorage between May 8 and 10. The presentations were as follows: 1) "Stability Analysis of Discrete Linear Systems with Quatized Input and State Measurements", and 2) "Boundary Layer Eigenvalues in Observer-Based Discrete-Time Sliding Mode Control".

Lane A. Baker, Ph.D.
NRC Postdoctoral Research Associate
Surface Nanoscience and Sensor Technology Section
Naval Research Laboratory
Washington, DC

Dr. Lane Baker received a "Celanese Outstanding Graduate Student Award" for his Ph.D. research at Texas A&M University under the direction of Professor Richard Crooks. This award is given annually to the top three graduates in Chemistry or Chemical Engineering. Dr. Baker is currently working with Dr. Lloyd Whitman at the Naval Research Laboratory on the self-assembly of gold nanoparticle arrays on silicon surfaces and their use as templates for hybrid organic-semiconductor structures.

Berran Yucesory, Ph.D. and Ning Gao, Ph.D.

Two former NRC Postdoctoral Research Associates at the U.S. Centers for Disease Control and Preventions (CDC) National Institute for Occupational Safety and Health (NIOSH), Health Effects Laboratory Division were honored as co-authors of publications which received "Alice Hamilton" awards.

The 2002 Alice Hamilton Awards were selected from 500 journal, proceedings, or book chapter publications by NIOSH researchers and 200 NIOSH reports published in 2001.

NRC Research Associate Berran Yucesory and her NRC Adviser Michael Luster co-authored the biological sciences winning publication:

Berran Yucesory, Val Vallyathan, Douglas P. Lansittel, Dan S. Sharp, Ainsley Weston, Gary R. Burlison, Petia Simeonova, Michael McKinstry, and Michael I. Luster, "Association of Tumor Necrosis Factor - (alpha) and Interleukin-1 Gene Polymorphisms with Silicosis", *Toxicology and Applied Pharmacology* 172, 75-82 (2001).

NRC Research Associate Ning Gao and his Adviser William E. Wallace co-authored one of two publications receiving honorable mention in the biological sciences category:

N. Gao, M.J. Keane, T. Ong, J. Ye, W.E. Miller, W.E. Wallace, "Effects of Phospholipid Surfactant on Apoptosis Induction by Respirable Quartz and Kaolin in NR8383 Rat Pulmonary Macrophages". *Toxicology and Applied Pharmacology* 178: 217-225 (2001).

James Delehanty, Ph.D.
NRC Postdoctoral Research Associate
U.S. Naval Research Laboratory
Washington, DC

Dr. Delehanty received a "best poster" award and was invited to give a talk at the protein micro-array section of the recent "Emerging Microarray Technology and Applications" held by IBC in San Diego in

March.

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Visa News

This fall brings a number of important changes in immigration regulations that all non-U.S. citizens should be aware of in order to maintain valid status. Laboratory Advisers and Laboratory Program Representatives also will find this information useful.

Mandatory address change notification -- **U.S. permanent residents** and **nonimmigrant visa holders** are required to notify the U.S. Immigration and Naturalization Service (INS) within 10 days of a change of home address. The government is now beginning to enforce this law. There can be serious consequences for aliens in future immigration benefits or re-entry to the United States. Detention and fines are possible in some cases. We urge all non-U.S. Associates to notify the INS of their current home address, even if they have never done so before. Because most visitors have been unaware of this requirement, it is our opinion that there is no reason to be worried about not having done so earlier. You can download the form (#AR-11) and instructions from the INS web site (<http://www.ins.usdoj.gov/graphics/formsfee/forms/ar-11.htm>). If this is your first address change notification, we suggest that you write the address you wrote on your I-94 (arrival-departure) card in the space marked "last" address, and your current address in the space marked "present" address. **Exchange visitors** should check "other" and write in "exchange visitor." Only **permanent residents** are required to include their "A" number. Make a copy of the form for your records, and mail it to the address shown at the bottom of the form. Always notify the NRC in writing immediately of any change of address.

Alien registration -- Aliens first "register" when they apply for their U.S. visas and again when they enter the United States. This is a reminder that all non-U.S. citizens are required to carry evidence of their legal status in the United States at all times. Though it is highly unlikely that anyone will ask to see it, we strongly advise you to have the correct document with you. For **J-1 and J-2 exchange visitors**, the I-94 card is acceptable. For **U.S. permanent residents**, the green card or I-551 stamp is acceptable. It is always wise to keep copies of all of your immigration documents for your own records.

Domestic travel -- If you will be on professional, programmatic, or personal travel within the United States, you must carry your immigration documents with you as evidence of your identity and legal status. Airlines and hotels may ask to see these documents.

International travel -- **J-1 exchange visitors and their families** who travel abroad must have certain documents in order to re-enter the United States. Associates should ensure that their passport and J-1 visa will not expire before they return from their trip. The IAP-66 form (now renamed DS-2019) must show an endorsement of the NRC Responsible Officer on the back. It is also helpful to have a cover letter from the NRC. When members of your family travel separately from you, or plan to return to the U.S. at a different time, it is very important that they carry a complete, 3-page DS-2019 form and a family attachment on NRC letterhead stationery. Be sure to contact the NRC well before you plan to depart to make arrangements for the documents that you and your family will need.

Travel to Canada or Mexico -- As stated in the last issue of the RAP Sheet, there are new regulations affecting nonimmigrant visa holders. Please contact the NRC before travelling to Canada and Mexico to discuss your plans.

Next issue: Immigration goes electronic! In upcoming issues of *The RAP Sheet*, we will report on the new government tracking system, beginning in 2003--the changes in forms and procedures, and what it will mean for you.

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Questions about J-1 visas may be directed to Peggy Wilson pwilson@nas.edu,

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United States Military Academy Photonics Laboratory

A research opportunity with a slightly different flavor is available at the United States Military Academy's Photonics Research Center (PRC). The PRC was established in May of 1987 through a Memorandum of Understanding between the Superintendent of the United States Military Academy and the Vice Chief of Staff of the Army. The PRC maintains three principal tasks: focusing on education of both cadets and officers, conducting basic and applied research, and supporting the Army and Department of Defense in the area of lasers and photonics.

The PRC has a world-class recognized research program. Sustained funding is provided by the Army Research Office with project specific funding from agencies such as the Defense Advanced Research Project Agency; Defense Threat Reduction Agency; National Reconnaissance Office; Army Research Laboratory; Army Research, Development, Test, and Engineering (RDT&E) Centers; and major weapons system program and project managers. In November 2000 the National Research

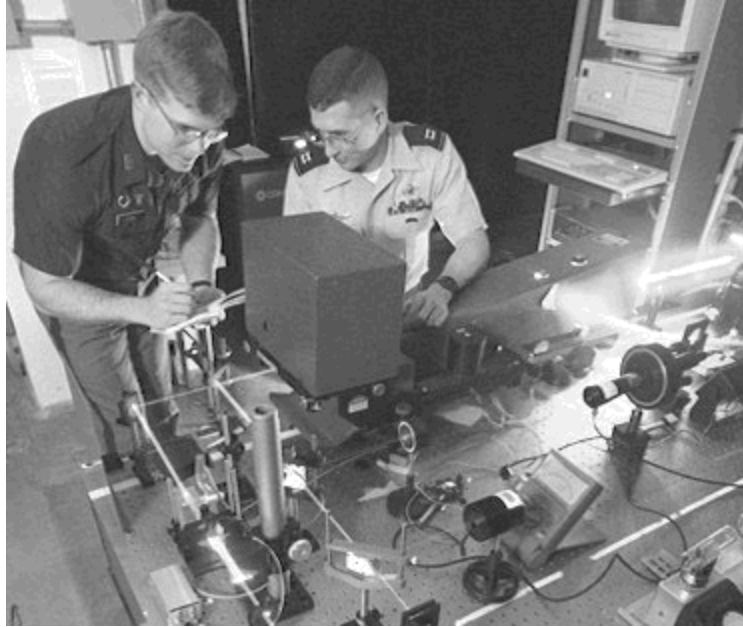
Council approved the PRC as a postdoctoral Associateship Program research site. The Departments of Chemistry, Electrical Engineering and Computer Science, and Physics comprise the PRC's research faculty.

The research faculty are devoted to basic and applied research in the area of optics and lasers. Basic research focuses on understanding nature on a fundamental level solely for the purpose of advancing knowledge, while applied research focuses on a final engineering outcome. The benefits of applied research are obvious when put in the context of the development of military systems. However, basic research is equally important and remains the foundation of every current and future technological innovation.

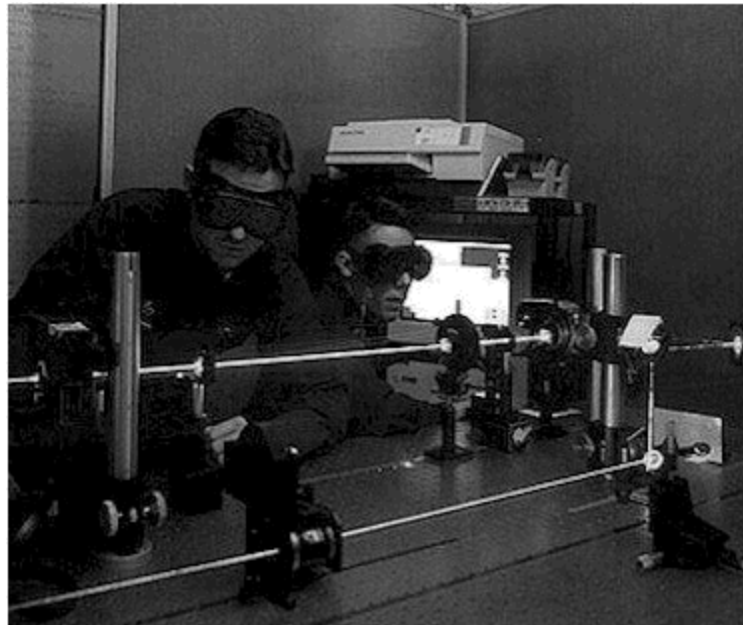
In addition to research, the PRC fulfills other tasks and functions. Each year the educational programs associated with the PRC introduce over a thousand cadets to a general familiarity with laser technology, provide over 50 cadets with an in-depth understanding of lasers and laser technology, and return officers to the field Army who are now considered experts in the development and application of laser technologies.

The PRC also provides advisory, consultative, and collaborative support to many agencies working on military programs. Many of the researchers participate as members of project advisory and review panels. They also provide technical consultation and assistance to various Army programs on such issues as concept feasibility, laser safety, and test and acceptance procedures. In this support role, the PRC is either currently or has in the recent past provided direct technical support to the Army Research Office, Army Research Laboratory; Edgewood Chemical and Biological Command; U.S. Army Special Operations Command; National Reconnaissance Office; National Security Agency; Defense Threat Reduction Agency; Ballistic Missile Defense Office; Natick RDT&E Center; Program Executive Office, National Missile Defense Program, Ground Based Radar System; Program Executive Office, Soldier & Systems Engineering; and the Department of Energy.

Besides supporting DoD, the PRC faculty are also significantly involved in professional societies and hold leadership positions in organizations such as the Optical Society of America, the Society for Applied Spectroscopy, the Institute of Electrical and Electronics Engineers, the American Chemical Society, and the American Physical Society. All in all, the Photonics Research Center would be a worthwhile research opportunity for postdoctoral researchers who would also appreciate being located at the historic site of West Point.



Lieutenant Colonel Founain supervises a cadet's research.



Two cadets conduct an experiment at the Photonics lab.

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Davies Fellowships at the United States Military Academy

Davies Fellows have a unique opportunity to contribute to and benefit from two world-class

institutions. The United States Military Academy (USMA) at West Point, New York, and the Army Research Laboratory (ARL) headquartered in Adelphi, Maryland, jointly execute the program, which is administered by the National Research Council. As educators, the Davies Fellows are Assistant Professors in the Department of Mathematical Sciences or the Department of Physics at West Point. Typically, they spend one academic semester each year teaching math or science to our nation's future Army officers. During the other semester and summer term, the Fellows conduct research that is coordinated with an ARL scientist, who serves as their NRC Research Adviser. Funding is provided to support the Davies Fellows' research, as well as to pursue professional endeavors such as attending professional meetings or conferences. This enables the Fellows to establish their research record. Consequently, the program provides an excellent opportunity for the Fellows to determine the route to take in their career, either teaching or research or both.

The Davies Fellows begin their program with an orientation on the art of teaching and guiding the learning process. After successful completion, their classroom interaction with the cadets at West Point allows the Fellows to assist in shaping the future leadership of the United States Army. Typically, Fellows teach courses within the core curriculum. The mathematics courses include topics such as Discrete Dynamical Systems, Introduction to Calculus, Differential Equations, Linear Algebra, Multivariable Calculus, and Probability and Statistics. The physics courses usually entail two semesters of General Physics. However, there may be opportunities within both departments to also teach elective courses. The teaching environment at the Academy is tremendous: each class is equipped with cutting edge technology, and the class size does not exceed 18 students. The teaching load is generally three to four sections of the same course, which is helpful for a new professor. Additional duties outside the classroom are limited.

Without exception, former USMA Davies Fellows have gone on to accept prestigious positions in the field of their choice. Some have pursued teaching positions and have been hired by prominent universities such as Lafayette College, Montclair State University, and Emory-Riddle University. Others were hired immediately after their Fellowship by respected employers within the research community such as Lawrence Livermore National Laboratories, The National Security Agency, or the financial and banking industry.

For more information regarding the Davies Fellowships at USMA, please contact MAJ Mike Johnson in the Department of Mathematical Sciences at (845) 938-7685 or LTC David Bedey in the Physics Department at (845) 938-3014.

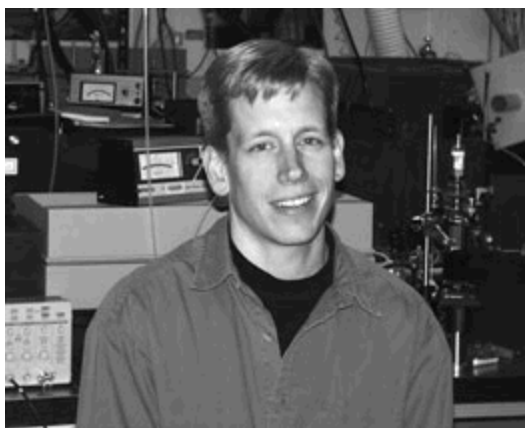


Dr. Dave Trubatch, one of our Davies Fellows, conducting additional instruction with CDT Geoff Costa, class of 2005.

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Dr. Steven Brown Wins Presidential Award

Dr. Steven S. Brown, a research associate at the Cooperative Institute for Research in Environmental Sciences in Boulder, Colorado, recently received the prestigious Presidential Early Career Award for Scientists and Engineers. Dr. Brown conducted much of the research leading to this recognition while an NRC Associate at the National Oceanic and Atmospheric Administration (NOAA) laboratory in Boulder from 1997 through 2000. In the following article, Dr. Brown describes this work and the value of his NRC Award.



Dr. Steven Brown

I came to the NOAA Aeronomy Laboratory in Boulder, CO in the fall of 1997 as an NRC postdoctoral research fellow. Although I participated in several research projects during the course of my three-year tenure, one of the most important goals of this time period was the development of a new instrument for making very sensitive measurements of the absorption of light by molecules in the atmosphere.

The technology behind the new approach is known as Cavity Ring-Down Spectroscopy, or CaRDS. It is a provocatively simple idea. The limit to the sensitivity of most "conventional" measurements of light absorption is simply the path over which the light may travel - normally limited by the physical dimensions of the absorption cell. CaRDS gets around this limit by introducing a pulse of laser light into the space between two very highly reflective mirrors - an "optical cavity." As the light makes many - perhaps thousands - of passes between the mirrors, the intensity decreases slowly with time because a very small fraction of the light is lost upon each encounter with the mirrors. This process is similar to the decrease in the intensity of sound after striking a bell - hence the term "ring-down." If an absorber is present inside of the optical cavity, the light intensity decreases more rapidly, just as the sound from a bell decreases more quickly if one lightly touches the bell. The measurement of the rate of the light intensity decrease in the presence and absence of the absorption gives a direct and very sensitive determination of the absorber's concentration. The sensitivity comes about because the light can travel nearly 100 kilometers (60 miles) inside of the cavity during this process - approximately 100,000 times the physical dimension of the instrument itself.

The CaRDS approach is a powerful method for making concentration measurements in the atmosphere. Much of the chemistry that is important in the atmosphere takes place on a very small concentration scale - a few molecules in a billion or even a trillion molecules of air. For example, the nitrate radical, NO₃, and dinitrogen pentoxide, N₂O₅, are a closely linked pair of chemical compounds that readily lend themselves to observation via CaRDS. The names and formulas of these compounds may seem obscure, but in fact they play a central role in the formation of both ozone pollution and acid rain. They occur only in the nighttime atmosphere because they are readily broken down by sunlight during the day. Furthermore, despite the important role that they play in atmospheric chemistry, they are present in exceedingly small concentrations.

Until recently, measurement of NO₃ was cumbersome, and observation of N₂O₅ in the lower atmosphere was impossible. Development of a CaRDS instrument, however, has made the measurement of these two important compounds sensitive, convenient, accurate, rapid and portable. For example, we have recently demonstrated simultaneous measurement of both compounds with a sensitivity better than one molecule in two trillion molecules of air.

During a recent four-week field campaign, the New England Air Quality Study, the instrument made measurements off the coast of New England aboard a NOAA ship, the U.S.S. Ronald H. Brown. The success of this campaign will allow new insights into the role that nighttime chemistry plays in regional air quality.

I cannot overemphasize the importance of my NRC fellowship in the development of this instrument. It not only made it possible for me to come to NOAA to pursue the project, but it gave me the freedom to make independent decisions about my research. I also took advantage of the travel stipend to present results at a number of conferences, both domestic and international. The NRC fellowship provided me with the footing for my present and future career as a research scientist with NOAA.

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An Adviser's Perspective - Dr. Joe Nuth, NASA Goddard Space Flight Center

The NRC Resident Research Associateship Program has served as a source of outstanding talent and potential staff in the Space Sciences Directorate at NASA's Goddard Space Flight Center for many decades. Many former NRC Associates are now senior members of the Directorate, myself included. The program provides Associates with an unequalled opportunity to compare their former university existence to life in the full-time research and service environment of a NASA Center. Some love the new environment; others are less enamored, yet all benefit by the chance to increase the breadth of their research experience and their range of personal contacts.



Dr. Joe Nuth is a former NRC Associate and is now an NRC Adviser at NASA Goddard Space Flight Center.

I was lucky enough to have spent two and one-half years as a Research Associate at NASA Goddard and another 14 months as a Resident Management Associate (RMA) in the Solar System Exploration Division at NASA Headquarters. This little-publicized program allows postdoctoral Associates the opportunity to participate in many aspects of NASA's Research and Analysis Programs, Flight Projects, or other major scientific initiatives. RMA's observe proposal review panels in action, sit in on Advisory Board meetings, participate in making both major and minor decisions, help to answer Congressional inquiries, and occasionally represent NASA Headquarters at scientific meetings and conferences. A short stint as an RMA is highly educational in a very practical sense. Associates learn how and why decisions are made. They have the opportunity to meet and interact with a wide range of NASA's senior management, influential members of the university community, and accomplished representatives of major contractors. RMA's leave NASA Headquarters as much more effective members of the research community.

As a Research Adviser in the NRC program, I have been fortunate to work with a string of incredibly talented individuals who proposed and carried out projects that propelled my own research into some very productive areas. In particular, Dr. Susan Hallenbeck came to my lab after completion of a Ph.D. dissertation in organo-metallic chemistry. I make dirt; that is, my research focuses on the condensation, growth, and metamorphism of silicate grains in astrophysical environments. Specifically, I want to understand how the spectral signatures of such materials correlate with their physical properties as the basis for the interpretation of infrared observations made by NASA spacecraft. Dr. Hallenbeck completed a very careful study of the spectra of fresh silicate condensates as a function of both temperature and time that serves as the basis for a Spectral Evolution Index that predicts the emergent spectral properties of astrophysical condensates that have experienced any defined time-temperature history. In addition, electron microscopy of these same samples has resulted in a better understanding of the physical and chemical changes that such condensates experience during thermal processing, and on a correlation of the spectral, chemical, and physical properties of the grains. My last Associate, Dr. Hugh Hill, has shown that fresh silicate condensates are extremely good catalysts for turning interstellar CO, N₂, and H₂ into complex hydrocarbons in protostellar nebulae. This new twist may have a considerable number of implications for the chemistry of comets and potentially for the origin of life on Earth, that we are only now beginning to explore. None of this research would have been possible without the ideas and enthusiastic work of these talented individuals.

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Adviser Profile - Dr. Andrzej W. Miziolek, U.S. Army Research Laboratory



Since Dr. Miziolek's arrival at the U.S. Army Research Laboratory, he has served as mentor to 16 NRC postdoctoral Research Associates.

Everyone has heard the story about training one's boss. Dr. Andrzej W. Miziolek is living proof that it can happen. Not only did he train his boss, Dr. Brad E. Forch, Chief of the Propulsion Science Branch at ARL, but he also gave him his first job—as an NRC postdoctoral Associate. Dr. Miziolek makes a point of being active in professional society meetings and keeping in touch with his university contacts for potential postdocs among the outstanding students in his field. He throws out his line and gets several bites - since his arrival at ARL, he has served as mentor to 16 postdoctoral Research Associates! He feels that the postdoctoral program is a wonderful win-win situation. On the one hand, the young scientist acquires important new skills not only in science but also in how organizations work, how research is funded, and how projects are executed successfully. On the other hand, the mentor benefits from having a young investigator bring in a fresh intellectual perspective as well as experience with modern instrumentation and up-to-date software. In addition, there is the pleasure and satisfaction of watching one's postdoc establish his or her own successful career, and, in some cases, to even become the Adviser's boss! Here's a brief overview of Dr. Miziolek's background and his work environment, as a quick glimpse why his postdocs are attracted to him.

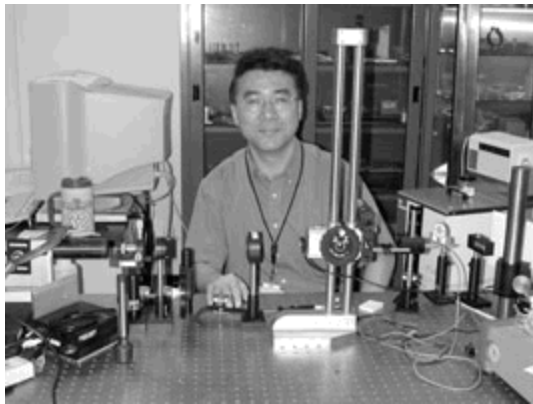
Dr. Miziolek is a Research Physicist at the U.S. Army Research Laboratory/Weapons and Materials Research Directorate, Aberdeen Proving Ground, MD. He is recognized for his expertise in combustion (particularly flame suppression) and plasma research, multiphoton spectroscopy and collisional dynamics, and for his work in applying laser spectroscopy to problems in chemical analysis and combustion diagnostics. Recently he has focused his attention to research on nanoscale materials, particularly on nanoenergetics, as well as on developing technology for force protection and anti-terrorism applications. Dr. Miziolek has co-authored over 45 refereed journal papers, three book chapters, and 80 government technical reports and publications. He has published a book entitled *Halon Replacements: Technology and Science* (A.W. Miziolek and W. Tsang, Editors, ACS Symposium Series 611, 1995) and is currently working as lead editor on two books: *Laser Induced Breakdown Spectroscopy (LIBS): Fundamentals and Applications* to be published by Cambridge University Press, and *Defense Applications of Nanomaterials* to be published by ACS Books.

Dr. Miziolek served as the founder and chair of the Optical Society of America (OSA) technical group on Fundamental and Applied Spectroscopy and has organized topical meetings and numerous symposia for the OSA and the American Chemical Society, including the popular Laser Applications to Chemical and Environmental Analysis (LACEA) topical meeting series. He was named a regular topical editor for Applied Optics in 1996 and has served two 3-year terms. In 1996 he was elected Fellow of the OSA. He received a B.S. degree in chemistry in 1971, magna cum laude, from Wayne State University, and his Ph.D. degree in physical chemistry in 1976, from the University of

California, Berkeley, working for Professor George C. Pimentel. Subsequently, he took a postdoctoral research position at the University of California, Irvine, where he worked with Professor Mario J. Molina on reactions relevant to the halocarbon destruction of stratospheric ozone problem. He has served on three Ph.D. thesis committees. Dr. Miziolek has been a recipient of numerous awards, including the Paul A. Siple Memorial Award (1st place) for the 1992 Army Science Conference. He also received Army R&D Achievement Awards in 1992 and 1997. He and his wife Lucy live in Lutherville, Maryland. He has two daughters, Nicole and Claire, and two stepdaughters, Ruth and Rebecca. His avocations include digital photography, videography, tennis, skiing, and playing the piano.

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The NRC - Air Force Summer Faculty Fellowship Program: A Participant's Perspective



Dr. Kenneth D. Kihm, Department of Mechanical Engineering, Texas A & M University.

For the past two years I have been granted an NRC Summer Faculty Fellowship to collaborate with the Air Vehicle Directorate at Wright-Patterson Air Force Base in Dayton, Ohio. My collaborative research with Dr. David Pratt, an NRC Adviser at WPAFB, has been to develop optical diagnostic techniques to measure microscopic observables in an evaporating thin liquid film. In practical terms, a comprehensive understanding of the microscale heat and mass transport phenomena can lead to the successful design of a Capillary Pumped Heat Transport System (CPHTS) for diverse cooling applications in air and space-flight vehicles. The critical issue is to ensure a stable device that will operate under high thermal and high g -loads, which requires an investigation of the microscale details of evaporating liquid meniscus. Has it been worthwhile to dare the 1,200-mile relocation from Texas to Ohio for two successive summers? The answer is definitely "Yes."

Though I recognized early on the importance of microscale measurements while developing various laser diagnostic techniques at Texas A&M, I have been seeking to apply my research to "real-world" needs. After giving a seminar at WPAFB in 2000, Dr. Pratt and I discussed the crucial need for microscale diagnostic techniques for aerospace cooling design improvement. We agreed that the NRC Summer Faculty Program could be a perfect opportunity to initiate a collaboration. I feel that during the past two summers I have made significant contributions to interdisciplinary research and expedited research progress for both WPAFB and TAMU. In addition, our collaboration has been successful on a long-term basis in that we were able to attract a major research grant from AFOSR to develop a concept of using a binary mixture working fluid with improved stability for enhanced operation of CPHTS.

The state-of-the-art facility at Dr. Pratt's laboratory enabled me to develop a new diagnostic technique. A laser scanning method for meniscus height measurements has been developed to replace the traditional telescope-hairline method that renders excessive measurement errors because of the subjectivity of human readings. The new automatic scanning method uses the principle of total internal reflection of a collimated laser beam when it contacts the internal surface of the meniscus and allows highly consistent readings with less than 10-micron uncertainties. The existing resources available from WPAFB infrastructure, including technical support for a computer data acquisition system and high-quality optical components, made it possible for me to devise an idea, implement a setup, and test for its measurement uncertainties within a period of only three months.

The NRC Summer Fellowship has provided a number of precious opportunities for "brain-storming" which would have been overlooked otherwise. Being exposed to the scientists and engineers working at a different environment from academia, I have been able to better understand the scope of the research tasks that are pursued by federal laboratories. Note that this will be a must for academicians to consider the initiation of research collaboration with them. Through attending numerous summer seminars offered by excellent internal and external speakers, I have been able to upgrade my research knowledge base as well as update the priorities of my teaching agenda. One of the internal seminars, presented on the past and future development of the WPAFB wind tunnel research, motivated the modification of my Gas Dynamics course to extend its scope to microscale flow controls and ionic combustion issues. An external seminar on the advanced flow visualization research presented by the NASA-Langley team inspired me to be open to new dimensions in visualization and presentation schemes in the future.

Scholars from two different communities, the federal research laboratory and the university, can thrive on interactions to their mutual benefit. There is no doubt that we can expedite productivity by combining the academic capability of research and the practical needs of technology. The question is how the two communities efficiently initiate the construction of a solid

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Reminder - We've Moved!

Please note address changes for
Research Associateship Programs
National Research Council:

U.S. Postal Service:
500 Fifth Street, NW, GR 322A
Washington, DC 20001

Express Delivery:
2001 Wisconsin Avenue, NW, GR 322A
Washington, DC 20007

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The RAP Sheet - Postscript

The objectives of this newsletter are to provide NRC Associateship Programs Advisers and Associates with important information regarding our programs and to provide some insight into the diversity and accomplishments of Program participants. We welcome your input in the form of topics you would like to see addressed or the names of Advisers or Associates you would like to see featured in future issues. Please contact us by email at rap@nas.edu, with your suggestions.

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Ask Dr. J

For future issues, we invite your comments about this newsletter and questions about the Associateship Programs. You may send comments or questions to "Ask Dr. J" at rap@nas.edu. Submissions may be edited for brevity.

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