

Autumn 2004

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THE NATIONAL ACADEMIE Advisers to the Nation on Science. Engineering, and Medici	<u>S</u> 1e

# ResearchAssociateshipPrograms NEWSLETTER

...from the Director

On November 19<sup>th</sup>, the National Research Council Resident Research Associateship Programs held a 50<sup>th</sup> anniversary celebration at the National Academy of Sciences building on Constitution Avenue in Washington, DC. Invitations to this event were sent to all current Associates, Advisers and agency representatives who work with us in making these programs successful. A copy of the invitation is included on this page. We thank all who participated as speakers, all who submitted posters, all who attended, all who assisted in the planning and execution of this commemoration of a half century of service to the federal government.

The 50<sup>th</sup> anniversary program included a brief history of the programs, along with speakers representing some of our sponsoring agencies and former Associates who have gone on to very successful careers in government and academia. The program concluded with a reception and a poster session featuring some of the research of our current Associates.

In its 50-year history, the NRC Resident Research Associateship Programs have made awards to more than 11,000 postdoctoral and senior scientists in all fields of science and engineering. Many of these Associates have gone on to careers in federal service. While we cannot account for all former Associates, we do know that more than 3,000 of our alumni are currently employed in federal agencies as active researchers, managers and administrators. Others have moved on to careers in academia and industry both in the U.S. and abroad. Still others hold leadership positions in foreign governments or in international scientific organizations.

Some themes have emerged over the 50 years of the Resident Research Associateship Programs. One theme is that there are tremendous opportunities for young scientists and engineers to begin a career in a federal research laboratory. While graduate students are not always aware of the breadth and impact of the federal research enterprise, we know that once they are Associates in residence they quickly develop an appreciation for the quality of the work done by the federal government. Another theme is that the Research Associateship Programs attract some of the best and brightest students. I attribute this to the structure of the programs – applicants are given the opportunity to participate in the design of their own research, and if they are successful, they receive a nationally recognized award to conduct that research. The last theme has to do with workforce development. When we visit Associates on tenure at sponsor laboratories, we also meet with Advisers and other laboratory staff, many of whom were themselves NRC Associates. For many of our sponsors, the NRC pipeline is a significant component of the recruitment of new scientists and engineers. Workforce development is probably the best justification for having a postdoctoral program.

In closing, I would like to thank all our sponsors, Advisers, Administrators, and Associates, past and present, for your contributions to making this a successful program.

NRC	Rese	arch Associateship Programs 50 <sup>th</sup> Anniversary
		Friday, November 19th, 2004
	Na	ntional Academy of Sciencess Building
12:00 F	PM	Lunch & Poster Viewing
	_	
1:00 PI	Л	Welcoming Remarks
		Rich Bissell, Ph.D., Executive Director, PGA
1.10 PM	Л	Brief History of the Research Programs
1.1011	1	Ray Gamble Ph D. Dir. Associateshin Programs
Agenc	v Ren	resentatives
1:30 PM	M	Hratch Semerijan, Ph.D., Acting Director
		National Institute of Standards and Technology
1:45 PN	Λ	John Montgomery, Ph.D., Director
		Naval Research Laboratory
2:00 PN	Λ	Bill Farland, Ph.D., Deputy Assistant Administrator
		Ofc. of Research, Environmental Protection Agency
Forme	rNR	<u>C Associates</u>
2:10 PN	Л	Guenter Riegler, Ph.D., Director
		NASA Astrobiology and Space Research
1.20 DI	4	Alian O'Drive DLD Dechange
2:30 Pr	VI	Alison O Brien, Pr.D., Protessor
		Official de vices, Offix. Of the Health Sciences
3.00 PM	Л	Barry Farmer Ph.D. Chief Scientist
	1	Materials and Manufacturing Directorate AFRI
3:30 PN	Λ	Break Poster Viewing
3:50 PN	Λ	Mary Lou Zoback, Ph.D., Senior Research Scientist
		U.S. Geological Survey
4:20 PN	Λ	Melchor Antunano, M.D., M.S., Director
		FAA, Civil Aerospace Medical Institute
4:50 PN	Λ	Isaac Sanchez, Ph.D.
		National Academy of Engineering Member
		w.J. Murray Chair in Engineering, U-1 exas-Austin
5-20 DA	1	Closing Domore
5.20 PT	V1	Ciosing ICHIdIKS
5.30 PM	Л	Recention & Poster Viewing

The NRC staff attend approximately 32 professional meetings each year to disseminate information about the NRC Associateship Programs. With the goal of increasing diversity of applicants to our program, we have added more meetings that target unrepresented minorities.

2005	PROFESSIONAL MEETINGS	DATES	LOCATION
American Astr	onomical Society	Jan 9-13	San Diego, CA
American Met	eorological Society	Jan 9-13	San Diego, CA
American Insti	tute of Aeronautics and Astronomics	Jan 10-13	Reno, NV
Society of Phot	o-Optical Instrumentation Engineers	Jan 25-27	San Jose, CA
National Confe	erence of Black Physicists	Feb 16-19	Orlando, FL
Pittsburgh Cor	ference on Analytical Chem and Applied Spectroscopy	Feb 28-Mar 3	Orlando, FL
American Che	mical Society	March 14-16	San Diego, CA
American Phys	sical Society	March 21-25	Los Angeles, CA
National Organ	nization for Professional Advancement of Black Chemists and Chemical Engineers	March 20-26	Orlando, FL
National Societ	y of Black Engineers	March 23-27	Boston, MA
American Soci	ety for Biochemistry and Molecular Biology	April 2-6	San Diego, CA
Experimental I	Biology	April 3-5	San Diego, CA
Conference on	Lasers and Electro Optics	May 24-26	Baltimore, MD
American Geoj	physical Union	May 23-27	New Orleans, LA
American Soci	ety for Microbiology	June 6-8	Atlanta, GA
Ecological Soci	ety of America	August 7-12	Montreal, Canada
American Che	mical Society	Aug 29-31	Washington, DC
American Fish	eries Society	Sept 11-15	Anchorage, AK
AIAA Space 20	005	TBD	
Human Factor	s and Engineering Society	Sept 26-30	Orlando, FL
Society for the	Advancement of Chicanos and Native Americans in Science	Sept 29-Oct 3	Denver, CO
Geological Soc	iety of America	Oct 16-19	Salt Lake City, UT
Florida Educat	tion Fund/McKnight Fellows Meeting	October	Tampa, FL
Science & Engi	ineering Alliance/Student Technical Conference	TBD	
Hispanic Assoc	iation of Colleges and Universities	Oct 15-18	Phoenix, AZ
Mexican Amer	ican Engineers and Scientists Symposium and Career Fair	Nov 1-6	San Jose, CA
Annual Bioche	mistry Research Conference for Minority Students	Nov 2-5	Atlanta, GA
Society for Neu	iroscience	Nov 12-16	Washington, DC
Society for Env	rironmental Toxicology and Chemistry	Nov 13-17	Baltimore, MD
Materials Rese	arch Society	Nov 28-Dec 2	Boston, MA
American Soci	ety of Cell Biology	Dec 10-14	San Francisco
American Soci	ety for Tropical Medicine and Hygiene	Dec 11-15	Washington, DC
American Indi	an Science and Engineering Society	TBD	
American Geo	physical Union	Dec 5-9	San Francisco, CA

**Advisers' Note:** If you are interested in promoting a specific research opportunity at any of these meetings, please contact Jane Dell'Amore at least one month prior to the meeting date to request flyers for your opportunity to be distributed at the meeting. Another effective means of finding prospective applicants for a specific research opportunity is to place an announcement on a professional society web site; this is relatively inexpensive compared to the cost of display advertisements in printed publications. If you will be attending a meeting not on our list, you can request a supply of flyers for your own use. Jane Dell'Amore can be reached at (202) 334-2768 or jdellamo@nas.edu

O L D E N

## On November 19, 2004, the Re-

search Associateship Programs of the National Research Council (NRC) of the National Academies will have been in operation for 50 years. The program started with the National Bureau of Standards (NBS) in November 1954, and has since expanded to include 30 federal agencies with research opportunities in virtually all disciplines of science and engineering.

Beginning in 1919, the National Research Council administered a Fellowship Program supported by the Rockefeller Foundation. This program awarded fellowships in the fields of mathematics, and in the biological, medical, and physical sciences. In 1954, the Rockefeller Foundation wished to end their sponsorship and requested that the NRC find a new sponsor.

The NBS (now called NIST) responded to this request and in November 1954, the first six Research Associates were selected from 21 applicants. The original program at NBS was set up using temporary civil service appointments and authorized up to ten positions per year. Today the maximum allowed at NIST is 60 two-year appointments per year.

The Naval Research Lab (NRL) followed the lead of NBS and joined the program in 1956. Other agencies joined the program in subsequent years and by 1967 there were twelve agencies. Today the NRC manages 30 contracts with government agencies to place postdoctoral and senior Associates in laboratories. The NRC Research Associateship Programs provide scientists and engineers with an opportunity to perform research of their own choice in a participating government lab. Associates are selected from applicants who are evaluated by NRC review panels.

In the first year of the program, there was only one panel review per year. Now, the NRC conducts four reviews per year for most government agencies. Applicants apply directly to the program by preparing a proposal in close collaboration with a Research Adviser.

Information about participating laboratories and Advisers can be found in the Associateship Programs Research opportunity books, and on our web site.

These opportunities, which now number more than 4000, reflect the research interests of one or more Advisers at a particular laboratory. Proposals and other application materials including transcripts, letters of reference, and an evaluation by the prospective host laboratory are reviewed by NRC panels drawn from academia, industry and government.

Successful applicants are ranked into quality groups and rosters are forwarded to the laboratory. Due to the competitive nature of this program, for most agencies, only highest ranked applicants are chosen.



Rosvel Cassondra Paul Hyeon-Bracho Thomas Hintze Kim

The National Research Council (NRC) Research Associates are making significant contributions towards Kennedy Space Center's (KSC) Road Map goal of increasing the quality and quantity of research and development activities. This is necessary for Kennedy to continue to their effective support of the Agency Enterprise Goals and Objectives.

As KSC continues to increase the number of Research Advisers and research opportunities, it is hoping to increase the number of RRAs at the Center. KSC's primary mission includes space launch operations, and spaceport and range technologies. Kennedy also has a very strong research component in the areas of Plant Space Biology, Advanced Life Support, Environmental/Ecological Studies, and Manned Space Flight.

KSC personnel contribute operational expertise to the design and development of new payloads and launch vehicles, and partner with a wide range of entities to develop new technologies for future space initiatives.

The Center's focus is expanding from primarily operations to one of increasing emphasis in testing, development, and applied research. Spaceport and range technology activities are built around KSC's Center of Excellence recognition in Launch and Payload Processing Systems. "As KSC

continues to expand from primarily operation activities to spaceport technology design, testing, and applied research, relationships with postdoctoral researchers become increasingly important", said Eduardo Lopez del Castillo, KSC's Program Manager.

"The NRC Research Associateship Program gives KSC's Advisers the opportunity to evaluate and select researchers that bring fresh ideas, new knowledge, and new approaches to help resolve challenging technical problems and to fuel the development and commercialization of new technologies.

These Associates spend a few years working at the Center giving both the Adviser and the Associate time to plan research activities, conduct experiments, collect and analyze data, develop prototypes, and publish results of their work." [Eduardo Lopez del Castillo]

The NRC Program Administrator Dr. Eric Basques and Program Coordinator Gwen Roby visited KSC in November of 2003 to tour the facilities and meet with ties and meet with Advisers and Associates. The NRC Associateship Program has been in place at KSC as of 1993. Since then, 16 Associates have been selected to conduct research at KSC. Currently four Associates are on base.

**KENNEDY SPACE CENTER** 

LAUNCHING THE NASA VISION

Dr. Ross Hinkle is the Adviser to Dr. Rosvel Bracho.



Rosvel Bracho, Ph.D.

They are working on the evaluation of carbon sequestration as it relates to land management, predominantly to wild land fire management and fire return cycle. In particular, they are looking for the effect of fire and fire frequency in carbon accumulation comparing carbon uptake, stocks, and distribution in plots of different age after burning in a subtropical forest system.

This team is collaborating with the United States Geological Survey (USGS) to evaluate the compatibility of a large network of existing eddy flux towers operated by USGS in Florida and to evaluate hydrological dynamics for selected watersheds within the Florida water management districts.

They have established open path Licor and implemented carbon measurement on the existing USGS tower located in a large agricultural area used for grazing. This has given them an opportunity to evaluate the effect of grazing on carbon sequestration in a Florida pasture.

Their work has been presented at several meetings sponsored by Ameriflux and the Ecological Society of America, and the team is preparing three papers for publication.

Dr. Ray Wheeler is Adviser to Dr. Hyeon-Hye Kim. To-



Hyeon-Hye Kim, Ph.D.

gether, they are investigating the growth and development of salad crops under different combinations of light-emitting diodes (LEDs) for longduration space flight.



Previous studies demonstrated that acceptable growth can be achieved with a minimal combination of red and

#### NRC Research Associateship Programs (RAP) Newsletter

blue LEDs, and the current studies focus on the effects of supplemental green LED light. The addition of green light results in plants that are more "normal"-looking to the human eye, which should benefit the crew for diagnosing plant performance and the onset of stress.

This team has presented papers at conferences sponsored by The American Society for Horticultural Science, The International Symposium on Protected Culture in a Mild-Winter Climate, Habitation Conference, American Society for Horticultural Science, and The American Society for Plant Biologists. In addition, they have published seven abstracts and five papers and articles.

Dr. Luz M. Calle is the Adviser to Dr. Paul Hintze. Their research involves the study of the corrosion protection of aerospace alloys by thin organosilane films. They employ electrochemical and advanced analytical methods to characterize the surface and corrosion protection processes. Special emphasis is given to developing novel coatings including those formed by self-assembled monolayers



Paul Hintze, Ph.D.

and those incorporating natural products.

Their work supports NASA's vision by developing materials that can be used in the exploration of the universe and in the protection of our planet.

In addition, Dr. Hintze will be mentoring a summer student in support of the NASA mission to inspire the next generation of explorers as only NASA can. Paul is one of our new Associates and in a short period of time has made a number of advances including synthesizing self-assembled monolayers from four different precursor molecules; performing X-ray Photoelectron Spectroscopy (XPS), Infrared Spectroscopy, and contact angle measurements on the monolayers; performing Electrochemical Impedance Spectroscopy (EIS) to characterize the corrosion protection processes; and performing poteniodynamic scans on the monolayer covered and bare surfaces.

They have written papers and presented results at conferences sponsored by the Electrochemical Society, the U.S. Army Corrosion Summit, and The International Symposium on Electrochemical Impedance Spectroscopy.

Ross Hinkle also serves as the Adviser to Cassondra Thomas, who recently started her Associateship. Her research is part of the Wetlands Initiative conducted by NASA, St. Johns Water Management District, and Dynamac. It involves creating a model that describes how nutrients flow through the managed wetlands of Merritt Island National Wildlife Refuge.

Separate models represent the three management protocols employed: Wildlife Area Management (WAM), Rotational Impoundment Management (RIM), and Open.

WAM marshes are managed to promote migratory bird usage, RIM marshes are managed for mosquito control, and Open marshes have been reopened to the Indian River Lagoon to reestablish "natural" conditions.



NRC Associate Cassondra Thomas, Ph.D.

Each of these management types profoundly affects how nutrients cycle in these marshes, how these marshes function, and how they impact the lagoon's water quality. Her model will follow how carbon, nitrogen, and phosphorus cycle through each of these marsh types and how they impact the Indian River Lagoon.



## Be sure the NRC has your current and complete contact information!



Mark Pender, Ph.D.

# Enhancing Collaboration --AFRL/ML-RICE UNIVERSITY

As part of an existing collaboration focused on carbon nanomaterials, NRC Associate Dr. Mark Pender with the Materials and Manufacturing Directorate of the Air Force Research Laboratory (AFRL/ML) spent 10 weeks at Rice University in the lab of Nobel Laureate Professor Richard Smalley. His visit was a part of a personnel exchange program between AFRL/ML and Rice which was successful because of the flexibility of the NRC program, its directors, Mark's AFRL/ML supervisors, and his Research Adviser, Dr. Morley Stone. By enriching his research experience and that of both institutions, Mark demonstrated how beneficial such programs can be for the researcher and the member institutions,

Mark's work focused on the synthesis and manipulation of single wall carbon nanotubes (SWNTs). By initiating collaboration with Dr. Jeffrey Hartgerink, Rice University Department of Chemistry, Mark was able to investigate the binding interaction of peptides with SWNTs. Peptide sequence had been determined to bind preferentially to SWNTs in phage display experiments performed at Wright-Patterson AFB. Phage display experiments employ commercially available, genetically engineered libraries of viruses each with a different peptide displayed on its surface. These libraries allow researchers to search for peptides with the highest affinity for a given target substrate through increasingly competitive binding steps, isolation of subsets and amplification of high-binding sequences.

Previous studies in this field have resulted in peptides that will preferentially bind to a specific crystal face of an inorganic compound or metal. The peptide studied was shown to bind tightly to the SWNTs with the nanotubes inducing significant secondary structure in the peptides. This structure was stable up to 50°C. characterization of the peptide/nanotube solutions by Raman microscopy seemed to indicate that the population of nanotubes had been slightly enriched in certain types of nanotubes. These results supported the original idea that peptides might be used to help sort out the complex mixture of nanotubes that are typically synthesized in large batches.

In Professor Smalley's laboratory, Mark investigated the impact of the surface during substrate growth of SWNTs by catalytic chemical vapor deposition (CCVD). Interaction of the

small catalytic particles with the substrate at the high temperatures required for growth could have a dramatic impact on catalytic efficiency, size of the tubes produced and, perhaps, type of tube grown. The initial results indicated that, at the least, the length of the nanotubes grown was significantly impacted by the surface. A three- to four-fold increase in length could be affected by simply changing the substrate. In addition, Mark began to investigate individual steps in nanotube growth and processing by using the Spin-on Catalyst matrix developed at Wright-Patterson AFB by Pender and coworkers. This matrix allows carbon nanotubes to be grown directly on indexed TEM grids and imaged on thin, transparent silicon oxide windows with limited and uncomplicated preparation (see SEM images below). Such efforts allow researchers to view SWNTs "before and after" various treatments.

In addition to bench work, Mark was also able to sample the varied research groups at Rice University. By being immersed in such a diverse research environment, Mark could learn and identify new and different ways people were attacking common research problems. For example, chemical modification of SWNTs with varied organic functionalities by Professor Jim Tour's group has begun to ease the complicated processing of SWNTs for bulk applications. By tailoring the chemistry of the functional group on the sidewall of a SWNT, one can greatly increase the miscibility of SWNTs with a polymer matrix. Such polymer/SWNT composite materials are of great interest to AFRL/ML for their high performance applications.

Since obtaining his degree in inorganic chemistry from the University of Pennsylvania, the NRC Research Associateship Program has allowed Mark to expand his experience to include biological techniques relevant to materials science and the study of carbon nanotubes in a first-rate research setting. His 10-week trip to Houston granted him exposure to the highest levels of research in a university setting and the value of partnerships and cooperation between academia and a Department of Defense laboratory.



# Global Health Initiative



In summer 2002, the NRC Associateship Programs announced a new fellowship program funded by the NRC / Ellison Medical Foundation

The ultimate aim of the fellowships is to generate critical knowledge needed to develop prevention and treatment strategies for infectious diseases as a part of a Global Infectious Disease Program. The research opportunities include enteric diseases, malaria and other parasitic diseases, HIV/AIDS, scrub typhus, and arboviral diseases such as dengue. The three awards (each renewable for a maximum of three years) were established to support research on the molecular pathogenesis of infectious diseases to be conducted at one of the overseas laboratories of the Naval Medical Research Center and the Walter Reed Army Institute of Research. These laboratories are located in Bangkok, Thailand; Nairobi, Kenya; Lima, Peru; and Cairo, Egypt.

Applications were reviewed by the NRC in the summer and fall of 2002, and awards were made for the first three fellows to start tenure in 2003. Two of the fellows are in the Walter Reed laboratories in Kenya, and the third fellow is conducting her research at the Armed Forces Research Institute in Medical Sciences (AFRIMS) in Bangkok, a Walter Reed laboratory in Thailand.



Dr. Bruno Kilunga Kubata earned his Ph.D. at the Gifu University in Japan. He is investigating the role of arachidonic acid metabolites in the life cycle and pathogenesis of parasitic protozoa in the laboratory of Dr. Samuel K. Martin in Nairobi, Kenya. Although Dr. Kubata's prior research has been in trypanosomiasis, the Walter Reed laboratory is particularly interested in the relevance to leishmaniasis and malaria.

Dr. Vandana Thathy carried out her Ph.D. graduate work at the New York University School of Medicine. Initially with Adviser Dr. Jose Stoute, and now with Adviser Dr. Samuel Martin, she is studying complement receptor 1 gene polymorphisms and severe *Plasmodium falciparum* malaria at the Kisumu, Kenya, laboratory.

The third Ellison Fellow, Dr. Darin Kongkasuriyachai, has a Ph.D. from the Johns Hopkins School of Public Health. Her research is on the molecular mechanism of relapsing malaria; specifically, the identification of hypnozoite stage antigens by differential display. Her Adviser/research collaborator at the AFRIMS laboratory in Bangkok is Dr. Jetsumon Sattabongkot.

Drs. Kongkasuriyachai and Thathy made research presentations at the December annual meeting of the American Society of Tropical Medicine and Hygiene in Philadelphia.



Although the NRC Associateship Programs will not be accepting any new applications for these Ellison fellowships until further notice, this partnering of the private sector with federal laboratories signals an important variation on the theme of our postdoctoral and senior scientist Associateship awards. It is hoped that the research productivity of these first three Ellison fellows will result in the decision for continuing support in this important arena of global health.

The Ellison Medical Foundation A NONPROFIT CORPORATION

## Working together -- Associates & Advisers at the NAVAL RESEARCH LABORATORY

## Gregg Jacobs, Adviser Scott Smith, Associate

Advisors play a major role in the lives of students. NRC Research Associate Scott Smith knows this well from his experience with his Adviser, Gregg Jacobs, Naval Research Laboratory (NRL).

Dr. Jacobs, Head of the Ocean Sensing and Prediction Branch of the Oceanography Division, was Scott's Adviser throughout graduate school at the University of Colorado. That collaboration led to Scott spending his summers at NRL, Stennis Space Center (SSC); after that, it was a natural transition for Scott to join Gregg there for his postdoctoral position under the NRL Research Associateship Program.



"Dr. Smith brings unique qualities, skills and capabilities to the lab that no one else here has. There's no researcher here who conducts this type of work, understands the details, and is able to build the type of capability ...needed in this area. He fits in well with where we want to go in the future." [Gregg Jacobs] Advanced data assimilation is a process for improving the determination of ocean properties; this is especially useful in shallow waters along the continental shelf near the coast. The data can come from such sources as satellites, moorings, ship observations, and autonomous vehicles.

"Many of the techniques in place don't work the same way in shallow water as they do in the deep ocean," said Dr. Smith. "My task is using advanced methods to bring the data together with our dynamic representation of the ocean dynamics – advanced data assimilation is a rigorous way of doing that."

Dr. Smith is putting his expertise to work on the Shelf Energetics Exchange Dynamics project (SEED) to determine the cause of cross-shelf momentum fluxes in the Mississippi Bight. To do this, Dr. Smith has constructed an adjoint of the Navy Coastal Ocean Model that will be used in several ways. Initially, it is being used to construct an array design that will help determine where to place mooring arrays to best measure the momentum flux.

When this is completed, he will use the adjoint to assimilate the data from the mooring arrays and determine the sources and amount of error in the ocean model being used, such as from boundary conditions, wind stress, and various dynamical components.

One of the important aspects of advanced data assimilation, said Dr. Smith, is that it is designed to assimilate different types of data simultaneously by taking into account their instrument and representativeness errors. For example, satellite altimetry measurements on the continental shelf are worse than in the deep ocean; advanced data assimilation can take this into account by reducing its influence in the assimilation process.

According to Dr. Jacobs, this advanced data assimilation process has revolutionized oceanography. It allows researchers to understand the observations in light of proposed dynamical systems. The approach also allows researchers to conduct tests on the dynamical systems. We can now answer the question, "Do the observations and proposed dynamics agree within expected errors?" This rigorous testing has not been possible previously.

The operational Navy uses advanced data assimilation for estimating currents in shallow waters. For example, if special forces wanted to know how currents are running at a particular site, this information could help them identify where to place the instruments to take data, assimilate that data and provide real-time and forecast currents for planning operations.

"My experience here has been enlightening. There are many bright scientists here spanning the different fields of oceanography.

During my time here I have substantially in-

creased my understanding of advanced data assimilation and ocean modeling and I have a much broader background understanding of oceanography as a whole." [Scott Smith]

### Yoko Furukawa, Adviser Erin O'Reilly, Associate

Dr. Erin O'Reilly started her NRC Associateship at Naval Research Laboratory (NRL) in October 2002, a few weeks after her PhD dissertation defense at Virginia Tech (VT) Geological Sciences Department. Her background and skill as an experimental mineral surface geochemist have been a great asset in the Marine Geosciences Division, NRL-Stennis Space Center, where she investigates the kinetics of aquatic sedimentbacteria interactions with her Adviser, Dr. Yoko Furukawa, and a team of multidisciplinary scientists.

The Marine Geosciences Division conducts a broadly-based, multidisciplinary program of scientific research and advanced tech-



NRC Associate Erin O'Reilly, Ph.D.

nology development directed toward maritime and other national applications of geosciences, geospatial information and related technologies. Research programs include investigations of basic processes within ocean basins and littoral regions. Models, sensors, techniques and systems are developed to exploit this knowledge for applications to enhance Navy and Marine Corps systems, plans and operations. In addition, NRL takes part in expanding the scientific knowledge base that is essential for the environmental conservation and clean-up of littoral regions.

Dr. O'Reilly's current research contributes to the Division's thrust as the nanoscale interactions between mineral particles and microorganisms affect (1) the behavior of suspended solids in littoral water columns; (2) the fabric and geotechnical properties of settled seabed sediments; and (3) the post-depositional fate of chemical constituents that are associated with the minerals and microorganisms. The suspended solids influence the optical properties of water column while seabed fabric and geotechnical properties dictate the mechanical behaviors and acoustic properties.

Dr. O'Reilly's primary tool of choice is the continuous flow reactor. She designed the original version while she conducted her dissertation research under the supervision of Dr. Michael Hochella Jr. at VT. Dr. Hochella is one of the world's leaders in nanosciences of naturally occurring materials. Since her move to NRL, Erin made great adjustments to the design so that the reactor can now host living microorganisms while they respire transition metals in mineral particles.

The NRC Associateship program can be a win-win situation for both the laboratory and the Associate as evident in the relationship between NRL and Dr. O'Reilly. NRL is continuously benefiting from the expertise, skills, and additional scientific perspectives Dr. O'Reilly has brought to the laboratory. At the same time, Erin feels that her tenure as an NRC Associate has been quite rewarding.

Working together at NRL

"Working with such a diverse team of scientists has really given me the opportunity to learn new things and to grow as a scientist; I hope to continue on here." [E.O'Reilly]

She has traveled to meetings in the Pacific Northwest as well as in Switzerland to disseminate her findings at NRL to the scientific community. The results of her work are currently being prepared for three publications.

## Fran Ligler, Adviser Caroline Schauer, Associate

This fall brought an exciting crop of fresh faces to the Department of Materials Science and Engineering at Drexel University. Not only are they welcoming a record number of new undergraduate and graduate students, they are also celebrating the arrival of two new faculty members, one of whom is Dr. Caroline Schauer, former National Research Council Associate with Dr. Fran Ligler at the Naval Research Laboratory, Center for Bio/Molecular Science and Engineering, Washington, DC.

Dr. Schauer is working with cuttingedge materials, with her interests steeped in the field of biomaterials and biotechnology, and bringing gifts outside of her research areas to the department. Dr. Schauer's creativity has already leant itself to several grant proposal titles, as well as the name of the departmental newsletter. When asked about the unique approaches she hopes to bring to the department, what assets will be most useful, Dr. Schauer cites her work as a "hybrid scientist" -- someone who combines chemistry, biology, and materials science and engineering.

Dr. Schauer received her B.S. in chemistry from Beloit College, Beloit, Wisconsin before completing her M.S. and Ph.D. in chemistry at the State University of New York at Stony Brook. She has worked as a postdoctoral fellow at the University of Twente, the Netherlands, and at Tufts University. Before joining Drexel, Schauer was an NRC Resident Research Associate at the Naval Research Lab's Center for Bio/Molecular Science and Engineering, where she was working on thin biopolymer films. Dr. Schauer is currently focusing on the development of an optical array for the detection of heavy metal ions. The thin biopolymer films of cross-linked chitosan are sensitive for specific aqueous metal ions, and her research is to exploit this sensitivity into a sensor array.

cited in "DREAM NOTES" (Drexel Research and Education in Advanced Materials) – the Newsletter from the Department of Materials Science and Engineering at Drexel University, Issue 5, Fall 2003. Author: Dorilona Rose, Program Coordinator of Research and Publications, Department of Materials Science and Engineering, Drexel University. Photographer: Suzie Fromer, Director, Publications and Public Relations, Office of the Dean, College of Engineering.



former NRC Associate faculty, Drexel University Caroline Schauer, Ph.D.

## **Former NRC Associate wins MacAthur**

Deborah Jin, former NRC Associate, and currently physicist at the Commerce Department's National Institute of Standards and Technology (NIST) in Boulder, CO



Deborah Jin, Ph.D.

and adjoint assistant professor of physics at the University of Colorado at Boulder, has been named a 2003 winner of a \$500,000 MacArthur Fellowship commonly known as the 'genius grant.'

Jin is a fellow of JILA, a laboratory run by NIST and CU-Boulder." **Fellowship** 

The MacArthur Fellows Program--John D. and Catherine T. MacArthur Foundation of Chicago-- awards unrestricted fellowships to talented individuals who have shown extraordinary originality and dedication in their creative pursuits and a marked capacity for self direction.

There are three criteria for selection of fellows: exceptional creativity, promise for important future advances based on a track record of significant accomplishment and potential for the fellowship to facilitate subsequent creative work.

The program is intended to encourage people of outstanding talent to pursue their own creative, intellectual and professional inclinations. The fellowship is a "no strings attached" award in support of people, not projects. Each fellowship comes with a stipend of \$500,000 to the recipient, paid out in equal quarterly installments over five years.

Past MacArthur Fellowship winners include World Wide Web inventor Tim Berners-Lee, poet Joseph Brodsky, population expert Paul Ehrlich, elephant researcher/conservationist Cynthia Moss and magician James Randi.

In 1999, Jin and graduate student Brian DeMarco created a new quantum gas that was named one of the top 10 scientific advances of the year by the journal *Science*.

They cooled a vapor of fermions—one of the two basic types of quantum particles, along with bosons—to a temperature less than a millionth of a

degree above absolute zero using lasers and magnetic traps. The result was a quantum state in which atoms behave like waves.

Fermions are important throughout physics because the basic building blocks of matter—electrons, protons and neutrons—all are fermions. Jin and DeMarco's research is a step toward a better understanding of these building blocks and may lead toward a new generation of atomic clocks and atom lasers.

Jin is the fourth CU-Boulder faculty member to receive a MacArthur Fellowship in the past four years and the seventh since the program began in 1981. Jin graduated from Princeton University in 1990 and received her Ph.D. in physics from the University of Chicago in 1995. From 1995 to 1997, she was a National Research Council Research Associate with NIST, working at JILA. After her postdoc assignment, Jin was hired as a NIST physicist and assistant professor adjoint in 1997. Jin is the recipient of several other awards, including the 2002 Maria Goeppert-Meyer Prize from the American Physical Society, the 2002 National Academy of Sciences award for initiatives in research and the 2000 Presidential Early Career Awards for Scientists and Engineers (PECASE), the highest honor bestowed by the U.S. government on young professionals at the outset of their independent research careers.

As a non-regulatory agency of the U.S. Department of Commerce's Technology Administration, NIST develops and promotes measurement, standards and technology to enhance productivity, facilitate trade and improve the quality of life. For more information on NIST, visit **www.nist.gov.** 



JILA was the Joint Institute for Laboratory Astrophysics. In 1994, acknowledging that name doesn't begin to encompass the breadth of science conducted at JILA, JILA's fellows decided to keep the word JILA but drop the meaning.

JILA is one of the nation's leading research institutes in the physical sciences. Its faculty, graduate students, and postdoctoral research associates explore some of today's most challenging and fundamental scientific questions. Research at JILA ranges from the small, cold world of quantum physics through the design of precision optics and atom lasers to the processes that shape the stars and galaxies, encompassing these seven broad categories.



Former NRC NIST Associate Elizabeth Mirowski, Ph.D.

#### Controlling Biomolecules w/ Magnetic Tweezers

Elizabeth Mirowski inserts a magnetic tip into a holder for a magnetic force microscope. The tip will be used to manipulate magnetic microparticles attached to biomolecules as part of a project to study folding patterns and other biochemical details. ©GeoffreyWheeler



Scientists demonstrate an array of magnetic traps designed for manipulating individual biomolecules and measuring the ultrasmall forces that affect their behavior.

Described in a recent issue of *Applied Physics Letters*, the chipscale, microfluidic device works in conjunction with a magnetic force microscope. It's intended to serve as magnetic "tweezers" that can stretch, twist and uncoil individual biomolecules such as strands of DNA. The device should help scientists study folding patterns and other biochemical details important in medical, forensic and other research areas.

The new NIST device works like drawing toys that use a magnetized stylus to pick up and drag magnetic particles. Magnetic particles 2 to 3 micrometers across are suspended in a fluid and injected into the device. The surface of a thin membrane enclosing the fluid is dotted with an array of thin film pads made of a nickel-iron alloy. When a magnetic field is applied, each particle is attracted to the closest nickel-iron "trap." So far, the research team has demonstrated that the traps attract individual particles and that the microscope tip can gently drag particles with piconewton forces. (One piconewton is about a trillionth the force required to hold an apple against Earth's gravity.)

The next step is to attach particles to both ends of biomolecules such as DNA. The trapping stations then can be used to hold one end of a molecule while the microscope tip gently pulls on the other end. By applying magnetic fields in different directions, the researchers hope ultimately to rotate the magnetic particles to produce complex single molecule motions for genomic studies.

patent applications

#### **CRAIG ARNOLD**

NRC Associate, Naval Research Laboratory (NRL) , Materials Science & Technology, 7/9/01-7/8/03

1) NC 84,451 Inventors: Craig B Arnold, Alberto Pique *Status: Provisional application filed June 11, 2003 (Provisional appl. serial no.:* 60/478,470)

#### Title: "Self-Filling Wet Electrochemical Cells By Laser Processing"

Laser processing of materials has broad applications to small, discreet electronic components according to former NRC postdoctoral associate Craig Arnold from NRL code 6372. Through his tenu re at NRL, Dr. Arnold has helped develop new technologies for processing of electrochemical cells and embedding electronic components that have resulted in two pending US patent applications.

The size and weight of unobtrusive devices are dominated by electrical components and energy storage devices, such as batteries, mounted to the internal circuit boards. In these cases, the area on the surfaces of the circuit board is very valuable for adding components, but as components are added, the height and mass of the device also increase.

In order to address these types of problems, the group has taken the novel approach of combining high precision laser micromachining (PLM) with a direct-write laser printing (DWLP) technique that enables the creation of fully embedded components that remain within the form-factor of the circuit board. PLM is used to remove material from the existing circuit board while DWLP adds not only surface mount components, but also microbatteries or microsensors. These processes can be done such that the existing circuitry on a board is unaffected by the addition of components.

2) NC 84,437 Inventors: Craig B Arnold, Alberto Pique, Ray AC Auyeung Status: Provisional U.S. Patent application filed on June 11, 2003; Provisional application serial no.: 60/478,471

#### Title: "Laser Based Technique For The Fabrication For Embedded Electrochemical Cells And Electronic Components"

In this second patent application, Dr. Arnold has studied individual power components such as high capacitance electrochemical capacitors (ultracapacitors, supercapacitors, pseudocapacitors) which have recently gained widespread attention. These systems have the ability to store relatively large amounts of energy while supplying a high power output, which is particularly important for microdevice applications. However, one of the main drawbacks for such systems is that they are difficult to fabricate in a small area

since they usually require thermal processing and messy addition of liquid electrolytes.

Using DWLP and a unique dual-laser processing technique, the group has developed an efficient, single-step approach to fabricating and filling mesoscale (~1 mm) electrochemical capacitors without the need for additional materials processing or electrolyte addition.

The approach takes advantage of the 'wet' deposition capabilities of DWLP and the local thermal processing that can be done using pulsed lasers. In the future, this technique may be applied to other types of technologically important wet electrochemical systems such as batteries or sensors.

### Title: "Microwave-

Attenuating Composite Materials, Methods For Preparing The Same, Intermediates For Preparing The Same, Devices Containing The Same, Methods Of Preparing Such A Device, And Methods Of Attenuating Microwaves"

Many vehicles use radars that operate simultaneous receive and send antennas. If there is sufficient coupling between the antennas, the microwave circuitry can go into feedback oscillation. This is prevented from happening by careful design of the platform, the antennas, and finally, by the placement of microwaveabsorbing material between the two antennas.

Microwave absorbent material is commercially available. It is a composite of iron ferrite in nitrile rubber. The amount of the iron compound is high, so that the weight of The growth of these domains, as loading concentration is increased, is called the onset of percolation, a phenomenon in which the composite as a whole becomes an electrical conductor.

As the percolation threshold is approached, the dielectric permittivity of the composite begins to change dramatically, with both the real and imaginary parts of the electric permittivity increasing. The high permittivities allow the composite to absorb microwave energy with relatively low weight loadings of metal fibers, yielding a light weight antenna isolation material.

#### **HENRY D YOUNG**

NRC Associate, NRL Materials Science & Technology. 8/15/00-8/14/03 1) NC 83,476 Inventors: Henry D Young, Raymond CY Auyeung, Bradley R Ringeisen, Douglas B Chrisey, Dana D Dlott Status: U.S. Patent application filed on September 6, 2002 (Application serial no. 10/237,072), based on Provisional U.S. application 60/327,773, filed on May 11, 2002). PUB. APP. NO. Title: 20030017277 **Title: "Jetting Behavior In The Laser Forward Transfer** 

Of Rheological Systems"

2) NC 83,186 Inventors: Raymond CY Auyeung, Alberto Pique, Henry D Young, Rohit Modi, Heuy-Daw Wu, Bradley R Ringeisen, James M Fitz-Gerald, Douglas B Chrisey *Status: Filed May 10, 2002* (*Application Serial No. 10/141,820) PUB. APP. NO. Title: 20020197401* Title: "Laser Forward

Transfer Of Rheological Systems"

#### **BOR-SEN CHIOU**

NRC Associate, NRL, Bio and Molecular Science & Engineering, 4/17/00-4/16/03 NC 82,273 Inventors: Paul Schoen, Joel Schnur, Ronald Price, Daniel Zabetakis, Robert Brady, Jr., Ann Mera, Dana Leaman, Bor-Sen Chiou, Walter Dressick Status: GEOCENTERS, the employer of one of the coinventors, has elected to retain title to this invention and to grant the U.S. Navy a nonexclusive license to the resulting patent. GEOCENTERS filed a U.S. Patent on Januarv 30, 2003. The application serial number is 10/353,952.

the composite on the platform can be significant.

patent applications

Our effort has been to reduce the weight of this composite, without compromising the isolation performance. Our approach has been to make a composite whose primary mode of absorption is dielectric rather than magnetic.

We have used a powder of conductive, high aspect-ratio metal rods in a polyurethane composite. The metal rods, loaded into the material at sufficiently high concentration, become entangled, and create domains spanned by conductive clusters of metal.

#### **JOHN MASTRANGELO**

NRC Associate, NRL, Bio and Molecular Science & Engineering, 8/28/00-8/27/03 NC 84,103 Inventors: Brett D Martin, R Shashidhar, Nikolay Nikolov, John Mastrangelo Status: U.S. Patent Application filed on March 26, 2003 (Application serial no.: 10/396,443)**Title: "Highly Conducting And Transparent Thin Films** Formed From New Fluorinated Derivatives Of 3, 4-Ethylenedioxythiophene"

UNITED STATES PATENT AND TRADEMARK OFFICE DEPARTMENT OF COMMERCE



# **Isa Bevell** is one of six Program Coordinators

who serve as the administrative liaison between Associateship Programs staff and NRC award recipients at our participating sponsor laboratories.

Lisa came to the National **Research Council in 1995 from** The Brookings Institution, a Washington, DC think tank. She initially worked on the Science and Technology for Children (STC) Project, a program under the NRC's National Science Resources Center which developed primary school science curriculum. When the STC Project concluded in 1997, Lisa joined the Associateship Programs as a **Program Assistant to Paul** Zielinski and part-time meeting coordinator.



Now a Senior Program Coordinator, she works with Judith Nyquist, Deputy Director and Program Administrator, assisting approximately 100 Associates at 14 sponsor laboratories; specifically, the Armed Forces Radiobiological Research Institute; the FDA/Center for Devices and Radiological Health; the National Institutes of Health; NIH/NIST Joint Postdoctoral Program; the NRC-Ellison Medical Foundation Fellowship Program; National Oceanic and Atmospheric Administration; Naval Medical Research Center, and the seven laboratories of the U.S. Army Medical Research and Materiel Command which include two overseas labs in Kenya and in Bangkok, Thailand.

Armed with a camera and her passport, Lisa is an avid traveler with a love of photography. She enjoys planning her adventures, but admits that you can't plan for everything, "It's the sense of the unknown that makes travel exciting. I once got lost in downtown Lima *and* forgot the address of where I was staying. I remembered the cross streets, but if I didn't know the language or how to ask for directions, I might very well still be there!" With regard to her Associates, Lisa encourages them to feel comfortable contacting their Program Coordinator as soon as questions arise. "After all, we're here to help."

# Jane Dell'Amore has been on the staff of

the National Research Council of the National Academies since 1974. Her first five years were spent in the Office of International Affairs working on the exchange program with the former USSR and its aligned countries.

After transferring to the Associateship Programs office in 1979, Jane assumed the position of Supervisor of Operations, which included overseeing the processing of all applications for Postdoctoral Research Awards.

In addition, she has been responsible for promoting the Programs in the scientific community, including coordinating attendance at professional scientific meetings and conferences. With the recent merger of the Research Asociateship Programs Office with the Fellowship Office, Jane assumed the responsibility for coordinating all publicity and outreach activities including the Ford Fellowship Program, the Research Associateship Programs, and a variety of others. As a result of this merger, the Associateship Programs has added several meetings to its list of outreach activities, all

of which target minority scientists and engineers.

In her spare time, Jane enjoys doing volunteer work with the elderly, weight lifting,



and creating beaded jewelry.

#### **U.S. Visa Processing Time**

Most visa applicants over the age of

13 are required to have personal interviews when applying for a visa, especially the first time. Depending on the time of year, this process might result in delays in travel and postponement of research. To offset delays during summer and holiday travel seasons, embassies give students and scholars priority interview appointments, reducing the waiting time. Once the visa application has been submitted, processing time can vary from days to weeks. Visa applications subject to "administrative processing" are sent for additional review and cannot be expedited. If this should cause a delay of more than 30 days, contact the NRC Visa Officer for assistance.

#### Visa vs. Duration of Stay for J-1 Rsrch. Scholars

If a visa stamp expires on one date, and the DS-2019 form expires on another, which date is important? The answer is: They both are, for different reasons. The J-1 visa validity determines whether you can apply to enter the United States from abroad. The visa stamp cannot be extended within the United States. The period shown on the DS-2019 form determines how long a J-1 visa holder may stay in the United States. It can be extended by the NRC Visa Officer. *A new entry visa is not required to remain in the United States, but if you travel outside the U.S. after your visa expires, you must apply for a new entry visa before returning.* 

#### **US-VISIT Program**

The US-VISIT program is part of a security continuum for visitors to the United States that begins at embassies overseas and continues through arrival and departure. When visitors apply for visas at U.S. embassies and consulates, inkless digital "fingerscans" and photographs are taken. When visitors arrive in the United States, they are again scanned and photographed, to be sure that the person entering is the same person who applied for the visa. This process adds about 15 seconds to the usual document check and short interview with the immigration officer. This also protects the traveler whose visa or passport has been stolen and is being used fraudulently by someone else. US-VISIT also applies to visitors from "Visa Waiver" countries. Exceptions to this policy are U.S. citizens, children under the age of 14, adults over 79 years old, holders of certain visas, and others determined exempt by the U.S. Department of State.

A self-service departure system is being developed -- departing nonimmigrant travelers will scan their documents and index fingerprints at kiosks or with US-VISIT exit attendants located in airport international departure areas. This system is being pilot tested now in 14 airports. Travelers on visas who are departing from these airports must comply with the exit requirements and will receive a printed receipt. For more information, see www.dhs.gov/dhspublic/interapp/content\_multi\_image/content\_mult\_ii ti\_image\_0006.xml.

#### **Special Registration Update**

Special Registration refers to a registry of citizens from certain countries or visitors identified by officials as being subject to

ISA UPDATE NR

NSEERS (National Security Entry-Exit Registration System). The Department

of Homeland Security announced significant changes in the requirements of Special Registration by suspending 1) the 30-day and annual re-registration requirement and

**2)** the requirement to report a change of institutional or residential address directly to DHS. J-1, F-1, and M-1 visa holders registered in SEVIS are no longer required to notify DHS of a change in their address *as long as they notify their program sponsor (RO or DSO) within 10 days of a move.* 

Visitors subject to Special Registration who travel abroad must register their departure with an immigration officer at the specially designated airport from which they will depart the United States. Failure to do so will cause serious negative consequences for you.

To determine if you are subject to Special Registration, check both sides of your I-94 Departure card in your passport. If you see the words "Special Registration" or "NSEERS," you are subject and you must be sure to comply with the requirements. For complete information on Special Registration, see http://www.ice.gov/graphics/specialregistration/index.htm.

#### **Five-Year J-1 Visa Planned**

The U.S. State Department is nearing approval of an increase of J-1 program length from 36 to 60 months for professors and research scholars. J-1 program sponsors have advocated for a longer program period to allow scientists more time to complete research projects. Details will be announced when they are known.

#### **Travel – Having Everything You Need**

Associates who hold J-1 visas must be sure that their visa documents are in order before they depart the United States. They must have a valid DS-2019 form, endorsed for travel by the NRC Visa Officer; a valid passport; and a valid visa in order to be able to return to the United States. Associates who have changed status to J-1 since their last trip abroad *must* allow enough time during travel to apply for a valid J-1 visa. This may take up to several weeks. Whether or not a new visa is needed, a cover letter from the NRC Visa Officer is often a helpful addition.

Associates whose visa stamps have expired are allowed to travel to Canada, Mexico or the Caribbean islands (except Cuba) for less than 30 days as long as they do not give up their I-94 cards, do not apply for a visa at a border post, and do not continue their travel outside North America before returning to the United States. Associates who have changed status to J-1 and do not have a J-1 visa may still follow this procedure, called "automatic revalidation." *Citizens of North Korea, Syria, Sudan, Iran, Cuba, and Libya are not eligible for automatic revalidation.* You are advised to contact the NRC Visa Officer for guidance and a special travel letter for this purpose.

#### What about Visas for Other Countries?

Each country has its own requirements for foreign visitors. Check the embassy web sites below: Non-U.S. citizens: <u>http://www.state.gov/misc/10125.htm</u> U.S. citizens: http://travel.state.gov/visa/americans1.html

ΩΜΕGA

**FRAVEL** 

NOR

# international postdoctoral fellowships Germany & U.S.

If you are an NRC Adviser who has ongoing or planned research collaboration with a university or other institution in Germany, and if you would like to have an NRC postdoctoral Associate from your laboratory participate in an international collaboration, we invite you to investigate a linked fellowship program between the NRC Associateship Programs and the Alexander von Humboldt Foundation. Current NRC Associates are eligible to apply for the von Humboldt Research Fellowship in order to expand their research to Germany.

The von Humboldt Research Fellowship is open to Ph.D. degree recipients who are under 40 years of age at the time of application. The applicant chooses an appropriate research mentor at a German institution, and a collaborative research proposal is developed. The research period in Germany can be a minimum of three months for three consecutive years (3x3), or one stay of six to 24 months.

Advisers and current NRC Associates who are interested in such an international research experience should discuss collaborative possibilities with your German research counterparts and with your agency Laboratory Program Representative for institutional support. Contact your NRC Program Administrator for further information.

Program and application information: NRC RAP web site and http://www.humboldt-foundation.de/en/programme/stip\_aus/stp.htm

## We are pleased to announce . . .

... as the travel management company handling travel needs of the Associateship Programs office.

Mrs. Deborah Lewis-Taylor is the on-site Travel Consultant for the account. Associates are still able to obtain direct-billed (i.e., paid by NRC) airline tickets and rental cars.

When communicating by fax or e-mail, Associates <u>must</u> include the term "Associate Travel Request" in the subject line, should be specific about their travel needs, and should include contact information to allow for quick response time.

www.nastravel.com includes the *National Academies Profile Registration*. The instructions help the traveler build a personal profile for Omega's use; access to the personal traveler profile allows Omega to better service the traveler's needs.

> 8:30 am – 5 pm EST Monday through Friday Phone (202) 334-3460 Toll Free (866)740-0627 • Fax (202) 334-3646 • E-mail nas@owt.net

# **2005 SCHEDULE**

## **February Review**

February 1	application deadline
February 14	rosters to agencies
Mid February	booklet revisions sent to agencies
February 28	LCR forms due
March 10/11	panel review/board meeting

## **May Review**

April	booklet revisions begin arriving at NRC
TBD	NASA LPR Meeting
May 1	application deadline
TBD	all LPR meeting
May 13	rosters to agencies
May 20	LCR forms due
June 17	panel review/board meeting

## **August Review**

August 1 August 12 August 26 Sept 26 application deadline rosters to agencies LCR forms due panel review/board meeting

## **November Review**

November 1	application deadline
November 11	rosters to agencies
November 28	LCR forms due
January 9	panel review/board meeting

Phone: (202) 334-2760 Fax: (202) 334-2759 E-mail rap@nas.edu

## National Research Council Research Associateship Program 50<sup>th</sup> Anniversary Poster Exhibition

#### AIR FORCE RESEARCH LABORATORY

#### **Kelly Anderson**

*Meso-Scale Simulations of Polymer-Layered Silicate Nanocomposites* Adviser: Barry Farmer

#### **George Jefferson**

Analytical and FEM Models for Integrated Design of Novel Hybrid Composite Materials/Components Adviser: Ronald Kerans

#### **Mark Pender**

Controlled Carbon Nanotube Synthesis and a Peptide-Mediated Non-Covalent Functionalization Approach for Composite Materials Adviser: Morley O. Stone

#### **Adam Smith**

An Investigation of Poly (thienylene vinylene) in Organic Photovoltaic Devices Adviser: Richard Vaia

#### **Dallas Trinkle**

*The Lattice Green Function for Photons Decoupling Short and Long Range Contributions* Adviser: Dennis Dimiduk

## 50<sup>th</sup> Anniversary Poster Exhibition continued

#### **ARMY RESEARCH LABORATORY**

#### **Michael Greenfield**

Failure Waves in Brittle Materials Adviser: T.W. Wright

#### Scott Kerick

*Effect of Cognitive Workload on Decision-Making Shooting Performance and Cortical Activity of Soldiers* Adviser: Laurel Allender

#### Stephanie M. Piraino and James F. Snyder

Chemical and Structural Characterization of Novel Energetic Binders for Next Generation Gun Propellants Adviser: Rose Pesco-Rodriguez and Steven McKnight

#### **ENVIRONMENTAL PROTECTION AGENCY**

#### Mustafa M. Bob

The Impact of Partial DNAPL Source Zone Remediation: DNAPL Mapping Using Light Transmission Visualization (LTV) Techniques Adviser: A. L. Wood

#### **Junghoon Choi**

*Formation Studies of Halonitromethanes in Drinking Water* Adviser: Susan D. Richardson

#### G. Christopher Shank

Impact of Sediment Water Partitioning on Spectral Properties of Dissolved Organic Matter Adviser: Richard G. Zepp

#### **Sheng Yue**

Diagnostic Indicators of Stream and River Impairment as a Result of Nutrients Adviser: Naomi E. Detenbeck

#### NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

#### John H. Glenn Research Center at Lewis Field

#### **Chih-Hao Chang**

Simulation of Compressible Multi-Fluid Flows with AUSM+ up Scheme and Stratified Flow Method Adviser: Meng-Sing Liou

#### **Aleksandr Nagorny**

*High Speed Permanent Magnet Motor Generator Design for FlyWheel Application* Adviser: M. D. KanKam

#### **Goddard Space Flight Center**

#### Ana C. T. Pinheiro

*Near Real Time Land Surface Temperature in the MODIS Rapid Response System* Adviser: Paul Houser

#### Anna L. Watts

*Surface Modes: A Viable Mechanism for Oscillation in the Tail of Type 1 X-Ray Bursts* Adviser: Tod E. Strohmayer

#### **Anthony Remijan**

*High Resolution Observations of Methyl Cyanide (CH3CN) Toward the Hot Core Regions W51 e1/e2* Adviser: Jan Hollis

#### **Emily Wilson**

*Ultra Precise Ground Based Column CO2 measurements using a Fabry-Perot Interferometer* Adviser: William H. Prosser

#### Natasha M. Johnson

*Fischer-Tropsch Type Synthesis of Organics using Iron-Silicate Grains* Adviser: Joseph A. Nuth III

#### Thomas.H. Burbine

Theoretical Calculations of the X-Ray Fluorescence from Mercury due to High Energy Electrons Adviser: Jacob I Trombka

#### Jordan Muller

Using LIDAR Topographic Data to Constrain Earthquake Hazards in Puget Sound, WA Adviser: David Harding

#### Lyndon B. Johnson Space Center

#### Sara Rathman-Zwart

The Ratio of Animal Protein to K Intake is Correlated with Markers of Bone Resorption in Ambulatory and Bed Rest Subjects Adviser: Scott Smith

#### Keiko Nakamura

15N-rich Organic Globules in the Tagish Lake Meteorite: Sensitive Proves of the Nebular Thermal Environment Adviser: Lindsay Keller

#### John F. Kennedy Space Center

#### **Cassondra R. Thomas**

*Evaluation of Management Effect Using Ecological Network Analysis* Adviser: Ross Hinkle

#### **Hyeon-Hye Kim**

A Comparison of Growth and Photosynthetic Characteristics of Lettuce Grown Under Red and Blue Light Emitting Diodes (LEDs) with and without Supplemental Green LEDs Adviser: Ray Wheeler

#### **Paul Hintze**

Prgano-Silicon Polymers for Corrosion Control Adviser: Luz Calle

#### **Rosvel Bracho**

Hurricane Frances Reduced Net Ecosystem Carbon Exchange by 30% in a scrub Oak Ecosystem in Central Florida Adviser: Ross Hinkle

#### Langley Research Center

#### **Derek Van Allen**

*Multifunctional Polymer-Based Nanocomposites for Photovoltaic Materials* Adviser: Dr. Catharine C. Fay

#### Matthew N. Herzog

*Cross-Linking of Single-walled Carbon Nanotubes for the Modeling and Production of High Performance Materials* Adviser: Dr. Catharine C. Fay

#### **Phillip Williams**

Dispersion and Deposition of Individual Single-Walled Carbon Nanotubes for NDE Sensors Adviser: Dr. William H. Prosser

#### George C. Marshall Space Flight Center

#### Ken Nishikawa

Particle Accelerating Magnetic Field Generation and Emission in Relativistic Shocks Adviser: Gerald Fishman

#### Jason Gaskin

*Evaluation of a Cadmium-Zinc-Telluride Focal Plane Detector for Hard X-Ray Astronomy* Adviser: Brian Ramsey

#### NATIONAL ENERGY TECHNOLOGY LABORATORY

#### Ali Mazaheri

*Simulations of Multiphase Fluid Flow Through Porous Media for Oil Recovery and Geologic Sequestration of CO*<sub>2</sub> Adviser: Duane Smith

#### NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY

#### Matthew W. Becker

Potential for Satellite Remote Sensing of Ground Water Adviser: Paul R. Houser

#### **Dean DeLongchamp**

Organic Electronics: Chemistry and Orientation with NEXAFS Spectroscopy Adviser: Eric Lin

#### **Romy Kirby**

Molecular Beacon Biosensors Adviser: Charlene Mello

#### **Douglas Meier**

MEMS Chemical Microsensors and Homeland Defense Adviser: Stephen Semancik

#### NATIONAL INSTITUTES OF HEALTH

#### **Amanda Myers**

Microarray Profiling of Alzheimer's Disease: Findings Based on Segregation by APOE Genotype Adviser: John Hardy

#### **Matthew Wood**

Structural Basis for Redox Regulation of Yap1 Transcription Factor Localization Adviser: Gisela Storz

### NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

#### John Lyman

Separate 20 day and 30 day Tropical Instability Waves in Subsurface Temperatures from the Tropical Atmosphere Ocean Array Adviser: Gregory C. Johnson

#### Jessica L. Neu

Development of an in situ gas Chromatograph - Mass Selective Detector for the Purpose of Studying Long-Range Pollution Transport from Asia Adviser: James W. Elkins

#### Elizabeth T. Methratta

Sediment Grain Size and Assemblage Structure in the Northeast US Continental Shelf Ecosystem Adviser: Jason Link

#### John P. Incardona

Defects in Cardiac Function Precede Morphological Abnormalities in Fish Embryos Exposed to Polycyclic Aromatic Hydrocarbons Adviser: Tracy Collier

#### **Emmanis Dorval**

Connectivity Between Fish Populations Using Otolith Chemistry to Track Sardine Stocks Adviser: Russell D. Vetter

#### NAVAL POSTGRADUATE SCHOOL

#### Alex Zhilyaev

*Microstructural Characteristics of Ultrafine-Grained Nickel* Adviser: Terry McNelley

#### **Bill Shaw**

Heat Transport in the Upper Arctic Ocean and Its Role in the Surface Energy Budget Adviser: Tim Stanton

#### **Roman Statnikov**

*Multicriteria Analysis of Real life Optimization Problems* Adviser: Alex Bordetsky

#### **U.S. ARMY MEDICAL RESEARCH INSTITUTE OF INFECTIOUS DISEASES**

#### **Katherine Brittingham**

Dendritic Cell Uptake of Bacillus Anthracis Spores: Implications for Anthrax Pathogenesis Adviser: Sina Bavari

#### **U.S. GEOLOGICAL SURVEY**

#### **Chris Green**

Measured Versus Predicted Recharge and Transport through a Sandy Soil in the San Joaquin CA Adviser: Barbara Bekins

#### **Daniel Bain**

*Determination of Basin Chemical Weathering Rates in Wet/Dry Climates* Adviser: Thomas Bullen

#### **Deborah Bergfeld**

*Diffuse CO<sub>2</sub> Degassing from Devils Kitchen Mt. Hood Oregon* Adviser: William Evans

#### **James Gray**

Analysis of Selected Organic Waste Water Contaminates in a Waste Water Impacted Stream Boulder CO Adviser: Larry Barber

#### Jinxun Liu

NCWin - A Network Common Data Form (NetCDF) Utility for Environmental Data Visualization and Modeling Adviser: Shuguang Liu

#### **Maureen Gwinn**

*Gene Expression Profile of Normal Human Mammary Epithelial Cells (NHMECs) following Malathion Exposure* Adviser: Ainsley Weston

#### **Michele Wolvoord**

*Modeling CO<sub>2</sub> and Carbon-isotope Dynamics in a Deep Unsaturated Zone near Beatty Nevada* Adviser: Robert Striegl

#### WALTER REED ARMY INSTITUTE OF RESEARCH

#### Laura S. Tonduli

*The ex vivo evaluation of reversible cholinesterase inhibitors as potential pretreatments for organophosphate toxicity* Adviser: B.P. Doctor

NRL POSTERS FOR NRC RAP 50 <sup>TH</sup> ANNIVERSARY
"Spatial Transformations as a Strategy for Managing Uncertainty"
Susan Trickett
Adviser Greg Trafton
"Tailoring the Optical Properties of Pentacene Derivatives for Use in Organic Light-Emitting Diodes"
Mason A. Wolak
Adviser, Zakya H. Kafafi
"Nanoscale Biosensors Based on Luminescent Quantum Dots"
H. Tetsuo Uyeda, Igor L. Medintz, Aaron R. Clapp
Advisers: Hedi Mattoussi, George Anderson
"Improving Experimental Phasing: The Role of Strongest Reflections"
Yanina Vekhter
Adviser, Jerome Karle "Using an Oxida Nanaarabitaatura ta Maka an Proale a Proton Wire?"
Michael Doescher, Jeremy Pietron, Jeffrey Long
Adviser. Debra Rolison
"Nanomechanical Studies of DDMS and Silk Diamaterials"
Nanomechanical Studies of FDNIS and Silk Diomaterials Donna Ebenstein
Adviser, Kathryn Wahl
"Flostomor Blands with Hotorogonoous Notwork Structure"
Ven Vii
Adviser. Charles Roland
"Hydrogen-Bond Acidic Poly(carbosilanes) for Chemical Sensor Applications"
Duane Simonson & Michael Papantonakis
Adviser, Robert McGill
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