THE NATIONAL ACADEMIES

RESEARCH ASSOCIATESHIP PROGRAMS

The Postdoc

Winter 2012

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Lab R&D goes commercial

Dr. Chris Doona, NRC Associate, and his colleagues at the **U.S. Army Natick Soldier Research, Development and Engineering Center (NSRDEC) in Natick, MA** carrying out research in complex reaction kinetics and mechanisms of unique effector-driven exothermic reaction chemistry have invented an ensemble of novel technologies based on the action of the disinfectant chlorine dioxide. Chlorine dioxide is well-known in the Chemical-Biological Defense community for its ability to inactivate spores of Bacillus anthracis, the causative agent of Anthrax. Chlorine dioxide is also an environmentally-friendly disinfectant that kills germs on surgical instruments, fresh fruits and vegetables, textiles and shelters, or on surfaces of Medical Units, Army Field Kitchens and Navy Galleys, and showers and latrines. As NSRDEC researchers found, the key is matching chlorine dioxide production with the specific application of interest.

NSRDEC's Business Development Team works with DoD Tech-Link to match invented technologies with businesses capable of making this R&D into commercial successes in select or niche markets.
http://techlinkcenter.org/summaries/chlorine-dioxide-disinfectant-and-handheld-sprayer

The licensee's video demonstrating their commercial product for sterilizing biological safety cabinets is below. Chlorine dioxide is the first method approved by the National Sanitation Foundation in 20 years and is safer, faster, and more environmentally-friendly than conventional formaldehyde treatments.
http://www.youtube.com/watch?v=Q7NNtv-prFk&feature=related

Left: Dr. Chris Doona, NRC Associate

Insert: "D-FENS" handheld sprayer (Disinfectant-sprayer for Foods and Environmentally-friendly Sanitation)

As a Modern Field Autoclave that sterilizes surgical trays, the PCS is an energy-independent, lightweight, carryable plastic suitcase embellished with valves, vents, circulators, and scrubbers to control heat and pressure and protect the environment during sterilization.

"The Postdoc" highlights research and activities of NRC Associates and Advisers who participate in the agency/laboratory programs with the NRC. Our newsletters are available in print and on out website: http://sites.nationalacademies.org/PGA/RAP/PGA_047804. Send all inquiries and submissions to Suzanne White (swhite@nas.edu)

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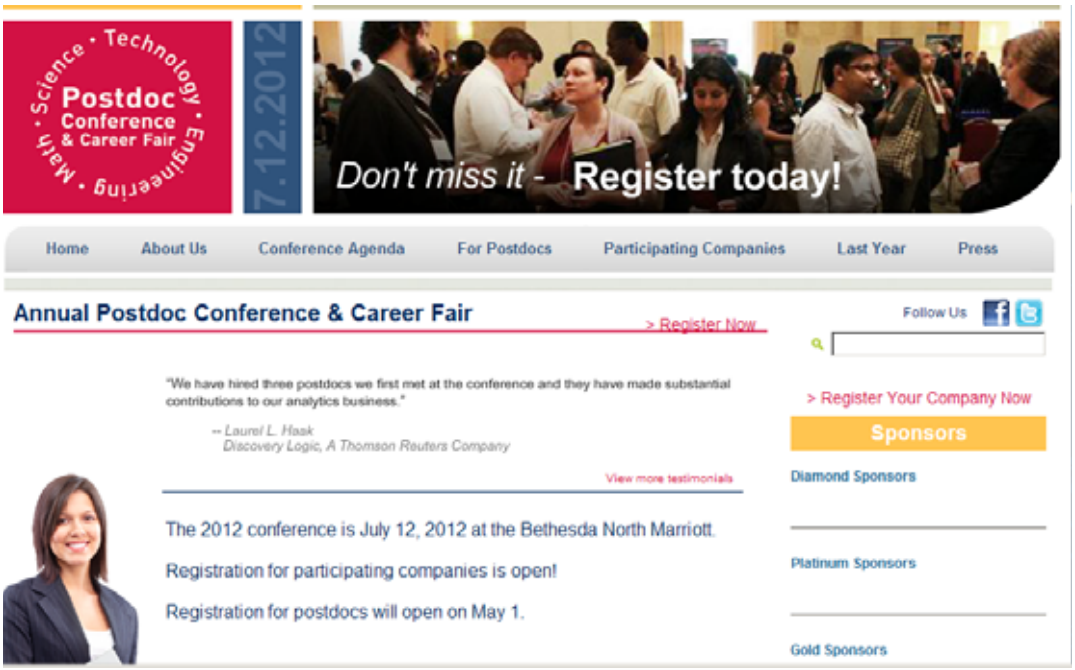
NRC Associateship Programs Representation at 2012 Meetings

NAME OF MEETING	DATES	LOCATION	
American Institute of Aeronautics and Astronautics	01/09-12/2012	Nashville	TN
American Meteorological Society	01/22-26/2012	New Orleans	LA
American Physical Society	02/27-03/02/2012	Boston	MA
Maryland/Loyola University Career Fair	2/15/2012	Baltimore	MD
American Chemical Society - Spring Meeting	03/25-29/2012	San Diego	CA
Experimental Biology	04/21-25/2012	San Diego	CA
Nat'l. Conf. on Race and Ethnicity in American Higher Education	05/29-06/02/2012	New York	NY
American Society for Microbiology	06/16-19/2012	San Francisco	CA
McNair Scholars Conference-University of Buffalo	07/01/2012	Niagara Falls	NY
STEM Annual Postdoc Conference and Career Fair (REDI)	07/12/2012	Bethesda	MD
American Chemical Society - Fall Meeting	09/10-12/2012	Philadelphia	PA
National Organization of Black Chemists and Chemical Engineers	09/25-28/2012	Washington	DC
Florida Education Fund-McKnight Fellows Conference	10/01/2012	Tampa	FL
Mexican American Engineering and Science Society	10/12-13/2012	Las Vegas	NV
Soc. for Advancement of Chicanos and Native Americans in Science	10/11-14/2012	Seattle	WA
Hispanic Association of Colleges and Universities	10/20-22/2012	Washington	DC
American Indian Science and Engineering Society	11/01-03/2012	Anchorage	AK
Annual Biomedical Research Conference for Minority Students	11/07-10/2012	San Jose	CA
American Society of Tropical Medicine and Hygiene	11/11-15/2012	Atlanta	GA
American Geophysical Union	12/06-09/2012	San Francisco	CA



Innovation in lightweight, energy-independent sanitizing solutions win Army R&D Award

Eating fresh fruits and vegetables ...contributes to a healthy diet, but recent outbreaks of *Listeria* in cantaloupes, *Salmonella* in tomatoes, jalapenos, peanut butter, and pistachios, and *Escherichia coli* in spinach, lettuce, and other leafy greens has raised significant alarm among consumers and public health officials regarding the safety of foods from intentional and unintentional contamination. In this "critical time" for Food Safety according to U.S. Food and Drug Administration (FDA) Commissioner Dr. Margaret A. Hamburg, the FDA is setting and enforcing tougher standards for the riskiest products, starting with fresh fruit and vegetables.

Food Safety expert researchers from the Natick Soldier Research, Development and Engineering Center (NSRDEC) are working on solutions to this challenge. Specifically, NSRDEC researchers developed the Portable Chemical Sterilizer (PCS) and the Disinfectant-sprayer for Foods and Environmentally-friendly Sanitation (D-FENS) to reduce foodborne pathogens while also protecting our environment.

The PCS and D-FENS are novel, “green” technologies that have been thoroughly tested and published in the book "Microbial Safety of Fresh Produce" by Wiley-Blackwell/Institute of Food Technologists Press Series. NSRDEC scientists **Dr. Christopher Doona and Mrs. Florence Feeherry** edited the book in collaboration with scientists from the U.S. Department of Agriculture (USDA) and academia. The PCS and D-FENS are featured in the chapter "Enhanced Safety and Extended Shelf Life of Fresh Produce for the Military" written by **Doona and Feeherry along with fellow scientists from NSRDEC** and academic collaborators.

The PCS and D-FENS are environmentally friendly technologies because chlorine dioxide, which works at low concentrations to kill microbes, also produces significantly lower levels of dichlorinated by-products compared to other sanitizers such as chlorine bleach rinses or chlorine gas. Chlorine dioxide is well-known for its potent antimicrobial action in commercial disinfectant and sanitation applications. Chlorine dioxide is registered by the EPA (U.S. Environmental Protection Agency) for use in food processing, handling and storage plants, and by the FDA for rinsing fruits and vegetables.

As a Modern Field Autoclave, the PCS is an energy-independent, portable, embellished plastic suitcase that uses small quantities of dry chemicals and water to generate chlorine dioxide in minutes and sterilize surgical trays. Under reduced operating conditions, Doona and Feeherry demonstrated that the PCS kills pathogens on whole tomatoes without compromising color, appearance, or taste. PCS treatments can also extend the shelf-life of sliced apples by eliminating enzymatic browning. Results are so promising that further testing of a broad range of fresh produce commodities is planned through agreements between NSRDEC and the USDA and academia. In the future, the PCS could be used to protect Warfighter health from food borne illness in global deployments by eliminating dangerous pathogens from fresh fruits and vegetables before they are consumed.

Another important way of protecting Warfighter health and preventing the possible spread of disease is by using good sanitation practices, particularly in confined spaces anywhere large numbers of personnel exist in a shared living environment. For example, the military needs to prepare, serve, and clean-up food service facilities in austere conditions in deployed locations around the world, to maintain the health of Warfighters. Many times this is done in battlefield kitchens, for which there is an important need to ensure proper food and food equipment sanitation. Similarly, good hygiene and sanitation are also important for Combat Surgical Hospitals (such as Deployable Medical Systems), showers, latrines, and other such facilities.

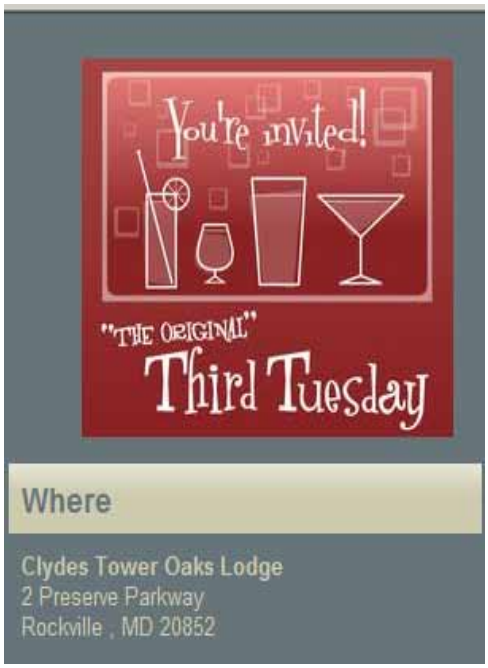
D-FENS offers a potential solution to meet these needs by safely generating chlorine dioxide in a commercially available handheld, collapsible spray-bottle made of a flexible plastic pouch material in a few minutes using small quantities of reagents and available water sources. The spray-bottle has a gusseted bottom that opens and allows the bottle to stand upright when full of disinfectant solution. Chlorine dioxide is readily sprayed on surfaces, then conveniently wiped away, easily creating hygienic environments by reducing bacteria such as *E. coli, L. monocytogenes, and Staphylococcus aureus* on surfaces and preventing the possible spread of diseases by secondary contamination.

D-FENS is small, compact, lightweight, and easily transportable, to reduce logistics burden, decrease fuel consumption and greenhouse gas emissions, and reduce waste entering landfills. The chlorine dioxide is not acidic or reactive. At the end of a n 8-hour work shift, remaining solution in the D-FENS spray bottle can be used to sanitize trash receptacles or purge bio-films from drains. The spray-bottle's plastic pouch material is chemically resistant, and can withstand multiple re-uses, if necessary.

The breakthrough nature of the scientific and technical achievements inherent in NSRDEC's ensemble of chlorine dioxide-related inventions is made all the more obvious by the Technology Transfer of these patents and pending applications to industry for rapid commercialization and Dual-use applications for military and civilian consumers alike, in accordance with the Federal Technology Transfer Act. These technologies have transferred to several companies via Patent Licensing Agreements (PLA's). Recent among them is a PLA with the chlorine dioxide company ClorDiSys Solutions, Inc., Lebanon, N.J signed in May, 2009. Currently, ClorDiSys Solutions, Inc. has developed packaging systems for the chemical reagents and is selling NSRDEC's organically-developed chlorine dioxide technology as a safe, easily handled commercial product for decontaminating laboratory biological safety cabinets with tremendous savings in time, convenience, and environmental protection compared to conventional sterilants such as formaldehyde.

Chris Doona, Ph.D., Florence Feeherry, MS

http://www.army.mil/article/28057/Innovations_in_lightweight__energy_independent_sanitizing_solutions_wins_Army_R_amp_D_Award/



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NRL Postdoctoral Colloquium Series

	Postdoc	Adviser	Talk Location
28-Mar 2012	Francisco Bezares	Joshua Caldwell	B260 R256
25-Apr 2012	Stan Briczinski	Paul Alan Bernhardt	B30R228
23-May 2012	Peter Coneski	James Wynne	B207 R155
27-Jun 2012	Darryl Boyd	Frances Ligler	B30 R228

Reminder to Advisers:

The 2012 Research Opportunity Update process is going on right now. It's the third year of our online revision management tool to help you keep your opportunities current. If you haven't already, you will soon receive a link to the data base, along with your username, password, and a link to step-by-step instructions on how to revise your Research Opportunities.

Here are a few tips for a smoother process: (1) make a note of your password since you will also need it to update your contact information, (2) revise your opportunities within four weeks of receiving the E-mail, and (3) mark your opportunities as "complete" so your Laboratory Program Representative will know they're ready for his/her review. Even if you have no changes, you still need to view your opportunities, mark them as "complete", and then save.

Our goal is to keep the Web site up to date and this online tool should enhance that process. We appreciate all the work you do to help us make this new procedure a success.

Agencies / Laboratories Participating in the NRC Research Associateship Programs

NAME	ABBREVIATION	REVIEW
Air Force Research Laboratory	AFRL	All
Armed Forces Radiobiology Research Institute	AFRRI	All
Army Aviation & Missile Research, Development, & Engr Center	AMRDEC	All
U.S. Army Medical Research & Materiel Command	AMRMC	All
U.S. Army Research Laboratory	ARL	All
Army Research Laboratory - U.S. Military Academy	ARL/USMA	All
U.S. Army Research Office	ARO	All
Chemical and Biological Defense Funded Laboratories	CBD	All
U.S. Army Edgewood Chemical Biological Center	ECBC	All
U.S. Environmental Protection Agency	EPA	All
EPA/Faculty Fellowship Program	EPA/FFP	All
FAA-Civil Aerospace Medical Institute	FAA/CAMI	All
Federal Highway Administration	FHWA	All
Institute for Water Resources, US Army Corps of Engineers	IWR	All
Marine Mammal Commission	MMC	All
Naval Marine Mammal Program	MMP	All
National Energy Technology Laboratory	NETL	All
Methane Hydrates Fellowship Program	NETL/MHFP	Feb. & Aug.
NIH (NIBIB)/NIST Joint Sponsorship Program	NIH(NIBIB)/NIST	Aug.
National Institute of Standards and Technology	NIST	Feb. & Aug.
Naval Medical Research Center/Naval Health Research	NMRC/NHRC	All
National Oceanic & Atmospheric Administration	NOAA	All
Naval Postgraduate School	NPS	All
Naval Research Laboratory	NRL	Feb., May & Aug.
U.S.Army Natick Soldier Research, Development & Engr Center	NSRDEC	All
U.S. Army Res, Dev & Eng Com/Armament Res, Dev & Eng Ct	RDEC/ARDEC	All
U.S. Army Research, Development & Engineering Command, NVESD	RDEC/NVESD	All

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Chirality of Nanotube Controls Growth: armchair nanotubes grow fastest

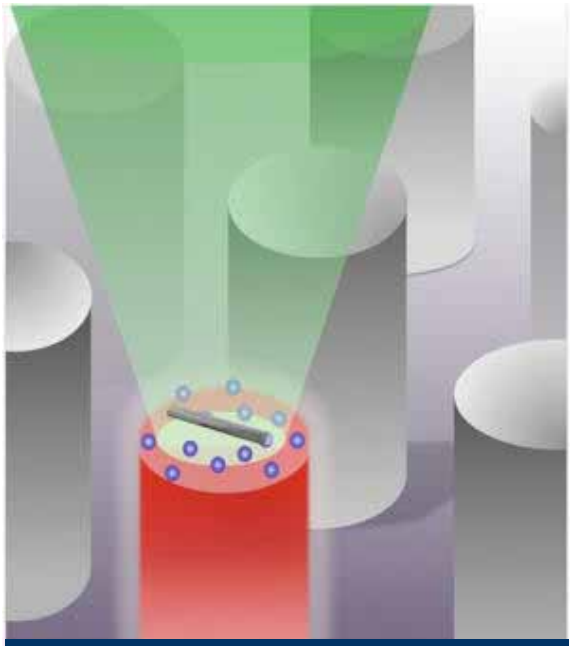
The Air Force Research Laboratory (AFRL) in Dayton, Ohio, has experimentally confirmed a theory by Rice University Professor Boris Yakobson that foretold a pair of interesting properties about nanotube growth-- that the chirality of a nanotube controls the speed of its growth, and that armchair nanotubes should grow the fastest.

The work is a sure step toward defining all the mysteries inherent in what Yakobson calls the DNA code of nanotubes, the parameters that determine their chirality -- or angle of growth -- and thus their electrical, optical and mechanical properties. Developing the ability to grow batches of nanotubes with specific characteristics is a critical goal of nanoscale research. The new paper by **Dr. Benji Maruyama, AFRL senior researcher and NRC Adviser; Dr. Rahul Rao,** former AFRL NRC Associate (now at the Honda Research Institute in Ohio; Yakobson); and their co-authors appeared this week in the online version of the journal Nature Materials.

It's an interesting denouement in a saga that began with a 2009 paper by Yakobson and his collaborators. That paper, which presented the theoretical physicist's dislocation theory of chirality-controlled growth, described how nanotubes emerge as if single threads of atoms weave themselves into the now-familiar chicken-wire-like tubes. It also garnered a bit of controversy over what precisely the results meant. ***"Boris caught some heat over it,"*** Maruyama said. ***"The experimental work out there indicated his theory might be true, but they couldn't confirm it. The good part about our work is that it's fairly unambiguous."***

Yakobson, Rice's Karl F. Hasselmann Professor of Mechanical Engineering and Materials Science and professor of chemistry, took it all in stride. ***"The criticism didn't affect anything; it was actually the best advertisement and motivation for further work,"*** he said. ***"In fact, (nanotube pioneer Sumio) Iijima noted early that 'helicity may aid the growth.' We have transformed it into a verifiable equation."***

Experimental confirmation of a theory is never final but always satisfying, he admitted, and the Air Force lab was uniquely equipped to prove the linkage between the speed of a nanotube's growth and its chiral angle. The chirality of a single-walled nanotube is determined by the way its carbon atoms are "rolled." Yakobson has described it as similar to rolling up a newspaper; sometimes the type lines up, and sometimes it doesn't. That alignment determines the nanotubes' electrical properties. Metallic armchair nanotubes, so named for the shape of their uncapped edges, are particularly desirable because electrons pass through from tip to tip with no resistance, while semiconducting nanotubes are useful for electronics, among other applications.



By learning to grow and measure single nanotubes, scientists at the Air Force Research Laboratory were able to confirm a theory by Rice Professor Boris Yakobson that predicted the chirality of a nanotube – its "DNA code" – controls the speed of its growth. (Credit: Rahul Rao/Air Force Research Laboratory)

Rao developed a technique in Maruyama's lab to measure the growth rates of individual nanotubes. ***"It's an impressive setup,"*** Yakobson said. ***"They can grow individual tubes in very low density and identify their signatures -- their chirality -- and at the same time measure how rapidly they grow."*** The technique involved mounting catalyst nanoparticles on microscopic silicon pillars and firing tightly controlled lasers at them. Heat from the laser triggered the nanotubes to grow through a standard technique called chemical vapor deposition, and at the same time, the researchers analyzed nanotube growths via Raman spectroscopy.

From the spectra, they could tell how fast a nanotube grew and at what point growth terminated. Subsequent electron microscope images confirmed the spectra were from individual single-walled nanotubes, while chiral angles were determined by comparing post-growth Raman spectra and nanotube diameters to the Kataura plot, which maps chirality based on band gap and diameter.

They noted in the paper that the results provide a basis for further research into growing specific types of nanotubes. ***"Now that we know what the growth rate is for a particular chirality nanotube, one could think about trying to achieve growth of that specific chirality by influencing growth conditions accordingly,"*** Rao said. ***"So, basically, we now have another 'knob' to turn. This work is at a very early development stage, and it's all about post-nucleation,"*** Yakobson said. ***"Nucleation sets what I think of as the genetic code -- very primitive compared to biology -- that determines the chirality and the speed of growth of a nanotube."*** He said it may be possible someday to dictate the form of a nanotube as it begins to bubble up from a catalyst, ***"but it will take a lot of ingenuity."***

Yakobson revealed a formula last year that defined the nucleation probability through the edge energies for graphene, which is basically a cut-and-flattened nanotube. But the earlier and related dislocation theory applies to the following growth, and if confirmed further may turn out to be his masterwork.

"The dislocation theory of growth is elegant and simple," Rao said. ***"It's still too early to say that it is the only growth mechanism, but Boris should be given plenty of credit for proposing this bold idea in the first place."***

Co-authors are former Rice graduate student Tonya Leeuw Cherukuri and David Liptak, both researchers at the Air Force lab. The Air Force Office of Scientific Research and the National Research Council funded the work.

The NRC "Postdoc" wanted to know, so we asked:

...Dr. Rao, in your own words, what essentially did you do at AFRL in Benji Maruyama's lab?"

Dr. Rahul Rao, former NRC Associate at AFRL

"Essentially, what I did at Dr. Benji Maruyama's lab at AFRL was develop a technique for conducting Raman spectroscopy studies in situ during a nanomaterial growth process via chemical vapor deposition (CVD). So the setup consisted of a CVD chamber coupled to a Raman spectrometer. Within this chamber, we placed samples consisting of microscopic pillars such that each pillar could be illuminated by a laser. This laser was used to heat the pillar as well as for collecting the Raman spectra. We were able to grow individual single-walled carbon nanotubes on these pillars and collected Raman spectra from these nanotubes, from which we computed the growth rates of these nanotubes. Also, we could locate these pillars later and perform further experiments such as electron microscopy to image the nanotubes, as well as more Raman spectroscopy measurements to figure out what kind of nanotubes we had.

Now, the structure of a carbon nanotube is equivalent to a rolled-up layer of graphite (graphene) in the form of a tube. The important thing is that it's electronic properties depend on how the nanotube is rolled up - it can be either metallic or semiconducting. The way the sheet of graphite is rolled up is defined physically by an angle called the chiral angle, which can range from 0 to 30 degrees. The nanotubes with a chiral angle 30 degrees are all metallic, so there is a lot of interest in the scientific community to find ways to selectively make these metallic armchair carbon nanotubes.

So after analyzing these nanotubes further, we were able to figure out the chiral angle of each nanotube from it's Raman spectrum. Once we had the chiral angles, we correlated them to the growth rates and found out that the growth rates are directly proportional to their chiral angles. This was out BIG find, and something that had been proposed in a theoretical paper by our Rice University collaborator (Prof. Yakobson), but never proven experimentally.

I think our results are very significant because people have been trying to control the chirality of carbon nanotubes during growth for a long time, and haven't been successful so far. But now that we know that the growth rate of a nanotube is directly proportional to it's chiral angle, we can start thinking about ways to control the growth rate in order to produce a desired nanotube structure. For example, metallic armchair nanotubes have the highest chiral angles, and hence also the highest growth rates. This means that in a regular CVD growth experiment, where all kinds of chiralities are produced, we could try to influence the growth using appropriate growth enhancers or inhibitors such that slower growing nanotubes do not grow and the final product contains metallic nanotubes." Rahul Rao

Rahul Rao

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Contact Rahul Rao

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NRL Postdoc Poster Sessions

Fall to Sigma Xi

Spring to WISE

Sigma Xi sponsors in autumn,
WISE sponsors in spring

SIGMA XI
The Scientific Research Society

2011 Fall NRL Post Doctoral Associate Poster Session
Wednesday, December 14, 2-4 pm. Building 222, Exhibit Room

Name	Code	Title
Ryan Compton	6111	Transient Absorption and Time-Resolved Fluorescence Studies of Solvated $Ru(Bpy)_3(X)_2$ Complexes
Peter Coneski	6124	Development of Functional Electrospun Polymer Fibers for the Decontamination of Chemical and Biological Agents
Paul A. Desario	6171	Designing 3D Titania Nanoarchitectures for Photocatalytic Water Splitting
Joseph F. Parker	6171	Redesigning electrode architectures en route to high-performance Zn-Air batteries
Hitesh Changela	6366	Analytical Studies of Insoluble Organic Matter from Primitive Meteorites
Sandra C. Hernández-Hangarter	6752	Plasma-Based Chemical Modification of Graphene
Samuel D. Tun	7668	The Physical Parameters of a Coronal Mass Ejection Core
Francisco Bezares	6881	Plasmonic Nanoantennae: Harvesting Large-area Electromagnetic Field Enhancement for Nanophotonic Applications
Colin G. Hebert	6112	Optical Chromatography of Biological Samples – Towards label free detection
Scott Walper	6900	Isolation of sdAb Specific for *Bacillus anthracis* Cells and Spores
Mike Brindza	5616	Refractive Index of Layered Polymeric Optical Materials
Paul D. Cunningham	6812	Multiple Exciton Generation in PbSe Nanorods
Ani Khachatrian	6812	High Resolution THz Spectroscopy of Ammonium Nitrate and Potassium Nitrate Crystalline Films
Nadeem Mahadik	6881	Correlation of Extended Defects on Carrier Lifetime in Thick SiC Epilayers
Anthony Smith	6123	Alkylphosphonic Acid Control over PbSe Nanowire Morphology
Nicholas Ouart	6723	The Effect of Electron Beams on Emission Line Ratios Used in Spectroscopic Diagnostics.

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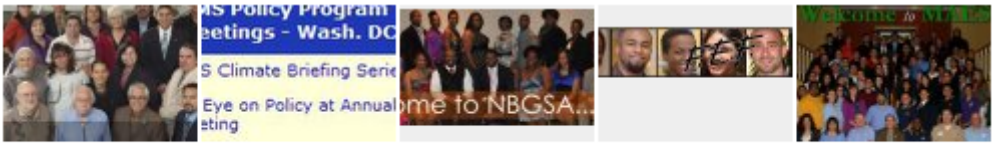

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March 25-29, 2012, see you in California

ACS National Meeting & Expo, San Diego Spring 2012
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7th Annual Johns Hopkins Medical Institutions Biomedical Career Fair
Wednesday, March 16 at 10:00am to 2:00pm at Johns Hopkins Medical Institutions Turner Concourse, East Baltimore Campus, 720 Rutland Avenue.
This event provides a unique opportunity to showcase biomedical companies and programs and recruit qualified candidates from Johns Hopkins and neighboring institutions.

7th Annual Johns Hopkins Medical Institutions Biomedical Career Fair
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Research Associateship Programs of the National Research Council
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Journey: NRC Associate to Mass spectrometry-based Proteomics and Cell Signaling

Dr. Suman S. Thakur, former NRC Associate at WRAIR

It was nice to work as a **National Research Council (NRC) Postdoctoral Research Associate at Walter Reed Army Institute of Research (WRAIR), Silver Spring, Maryland, USA. in the Department of Biochemistry with post-doctoral advisor Dr. B. P. Doctor and Dr. Richard K. Gordon from year 2002 to 2004.**

WRAIR had good environment for research. Among the facility that I like most was Mass spectrometry, NMR, X-ray crystallography and animal research facility. Still, I remember the day when I had chance to give a talk in WRAIR Auditorium on the topic "Do you want to save the soldier: think plants" and auditorium was full of audience. I had chance to work and interact with wonderful lab mates, advisers, several scientists and staffs who were working in WRAIR **including Dr. Rothman**, and Drs. Leader and Silman, NRCs from Israel.

I was working on Purification, characterization and synthesis of natural plant activator of cholinesterase and purification of plant cholinesterase and also got exposure of cell biology, experiment on animals and cholinesterase assays with robotic machinery. Further, had chance to purify cholinesterase from Mung bean sprout, and activator from wheat leaf that I had grown some in my lab and majority in my basement (during winter) and also in my garden (during Summer) of my rented house in Silver Spring, Maryland, that has been kindly allowed by my house owner. I remember Dr. Gordon came to the basement to take the photographs of my experimental plants. Again, later, I saw his same excitement, when he came to meet me at the airport in Munich where I was pursuing my post-doctoral research before catching his connecting flight to Croatia.

After that, I moved to one of the greatest research institute of my country, Indian Institute of Science, Bangalore, India. It was my privilege to work on Mass spectrometry in Molecular Biophysics with a great teacher Prof. P. Balaram. I enjoyed doing *de novo* peptide sequencing using Ion Trap and MALDI (Nair et al, 2006, Thakur and Balaram, RCM 2007).

Later, doing peptide sequencing without reduction and alkylation became my interest (Thakur and Balaram RCM, 2007). Then thought when most of the people use positive ion mode for sequencing, why doesn't one try to fragment intact peptide without reduction and alkylation in negative ion mode. Interestingly, negative ion mode gave specific signature peak for disulfide bond (Thakur and Balaram, JASMS 2008).

This idea was used to characterize the trisulfide, tetrasulfide and polysulfide that have been formed using alkali treatment of peptides (Thakur and Balaram, JASMS 2009). Negative ion mode fragmentation was also useful for characterization of alpha and beta containing cyclic peptides from fungi (Thakur *et al*, JASMS 2009). Further had chance to catch the native and deuterated dimer structure of triosephosphate isomerase from *Plasmodium falciparum* in gas phase (Thakur *et al*, PEDS, 2009) that Prof. P. Balaram had always encouraged me to do. During this process, different stage of protein unfolding and most importantly water molecules were caught in the gas phase. Working with Prof. Hemalatha Balaram on her ongoing Malaria project was stimulating experience (Bulsu *et al*, MBP, 2011). During my stay at Indian Institute of Science, I had also chance to work on RNA methylation in E coli with Prof. Umesh Varshney (Das *et al*, EMBO J, 2008) and was able to catch RNA methylation by mass spectrometry. Further, got chance to work with Prof. V. Rabindranath on effect of *Withania somnifera* on Alzheimer's disease that has recently been published in PNAS (Sehgal *et al*, PNAS, 2012).

Later, to do high- throughput proteomics, I moved to Prof. Dr. Matthias Mann's lab, at Max Planck Institute of Biochemistry in July 2009. The stay at Max-Planck was really exciting. There I focused on developing, chromatography techniques using small particle size, long column and long gradient and increasing the collision energy in mass spectrometry. This technique worked wonderfully and it characterized more than 5,350 human proteins in triplicate single run, without pre-fractionation of the peptide mixtures and also characterized about 68 % yeast comprehensive proteome in single run analysis (Thakur *et al*, MCP 2011, that became most read paper in MCP, August 2011). Then, used this technique with different methods of fractionation, and characterized half of the human proteins in human embryonic stem cell (unpublished results). Interestingly, most of the marker of human embryonic stem cells and transcription factors were found in our database. . I have worked on several post-translational modifications. During my stay at Germany, I had chance to visit several parts of Europe including U.K, France, Switzerland, Italy and Austria. But most memorable was delivering a talk in proteomic seminar series, at Department of Sir William Dunn School of Pathology, at University of Oxford.

Then I moved back again to my own country-India, in September 2011, to start my own group at the prestigious Centre for Cellular and Molecular Biology (CCMB), Hyderabad, India. My lab is based on Mass spectrometry based proteomics and cell signaling. We are trying to understand the pluripotent nature of human embryonic stem cell and its difference with differentiated human embryonic stem cell at the level of cell signaling. Mass spectrometry based proteomics will play a big role in the clinical world and we need to develop some suitable techniques for its ease in analysis according to clinical problems, especially in body fluids and tissues proteomics. My passion is developing new techniques to understand the fundamental science, and translating the science to cures for some human diseases.

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http://www.ccmb.res.in/staff/sumanthakur/home.html
http://www.ccmb.res.in/scientistdetails.php?grpid=79

Joan Sagransky Rosenthal, who is Manager of the Travel and Meetings Unit of the Fellowships Office of Policy and Global Affairs, personifies dedication and diligence. Joan was an undergraduate in sociology (George Washington University) when she took a position, during her senior year, coding the results of a sociological study at the National Academies. Her employment, then with Johns Hopkins University, led to her employment at the National Academies. Joan's influence broadened from the field of sociology to envelop many disciplines funded by private and public institutions.

Joan's tenure at the National Academies led her, early on, to a leadership position with the National Science Foundation Graduate Fellowship Program. From the years 1976 to 1992, Joan was Program Supervisor for that program. Applications in that program typically exceeded 6,000. Joan checked each application for eligibility and appropriateness of panel selection. For many years, Joan managed a staff that fluctuated in number, depending on "fellowship season" since the number of employees expanded between September and April each year. It was not unusual for Joan to coordinate the tasks of thirty dedicated staff members.

Joan's responsibilities called upon her exceptional skill at working with many different individuals on many different tasks simultaneously. Joan is a superb administrator. She is that rare individual who can provide strong leadership while always retaining her sense of humor and perspective. Goals are always anticipated and met if the task comes under Joan's direction, leadership, and coordination.

Along with Chris O'Brien, Joan was co-founder of the Fellowship Roundtable in 1995 and it continues to be an ongoing project with over 100 Fellowship Administrators as members.

Joan has served on many Academy committees and is a member of Toastmasters' International of which she was President, Sergeant-at-Arms, and Board Member for many years. Joan has reached a personal goal of providing excellent work for over thirty-seven years at the National Academies. She and her husband, Jay, will now enjoy leisure time together since Jay retired from NASA in December, 2011. A trip to Hawaii will provide "rest and relaxation" which, as Richard Bissell, PGA Executive Director, said is "so well deserved."

Poem from the Travel Team

Why do they call it retirement?
Are you going to bed?
Are you just having a rest?
Receding into the distance?
Or will work truly stop?
Stop work? How silly.
Will your feet be forever in slippers?
Will you be glued to daytime TV,
Unable to shift from your chair?
Does your brain turn to jelly
The second you leave?
Stop work. I don't think so.
Now the work truly begins
Mountains to climb
Rivers to swim
Oceans to sail
Roads to follow
Dreams to turn to reality

Joan! Joan!

Joan!

Joan has pledged to stay in touch with her friends and co-workers, past Ford Foundation Fellowship recipients, and Regional Liaisons in the Ford Foundation Fellowship Program. Her co-workers whom she has mentored, laughed with, and challenged will miss her and that will be eased by the communication that is so readily available through electronic means. We may even receive photos electronically of new explorations and avenues of fun for Joan and Jay!

In her spare time Joan is an avid bowler and member of the United States Bowling Congress, loves to golf, is an animal lover and advocate, and adores her husband, family, and friends!

Our hope is that Joan knows how deeply she is appreciated and loved! We expect many visits and even more opportunities to laugh with Joan over a glass of wine! Pinot

"I've had the pleasure of working with Joan for nearly 23 years. As a co-worker, her loyalty and dedication to the Fellowship Office were unmatched. She always went the extra mile, no matter what it took, because her job was important to her. And she wasn't afraid to speak up on behalf of her employees. The Fellowship Office won't be the same without her. As a friend, I will miss the lunches and happy hours where Joan amused us with her interesting stories. On business trips to California, she often organized dinners and fun activities, which helped the staff to bond. Because of that, I've frequently joked that Joan should be a Cruise Director after she retires. I guess only time will tell. Joan, congratulations and good luck in your retirement!"
Marla Allentuck

"Joan…you know how much I'll miss you and how very VERY special your friendship is to me, so I just want to leave you with little memories that I hope will bring a smile to your face or maybe even make you laugh out loud ...Joseph Henry and looking down on K Street at just the right time...GR TWICE!....who moved my stuff?.....best free concert ever heard from a balcony…..pot luck moving holiday parties in GR....RR…hooked on Pinot Grigio. …how much do we weigh?!?.....I knoooow.....theeee best outdoor secret place…..CA sand…..pretty blue drinks….Our Bar….Peeps…..Glen Alden Road….Al's hat….. geeze, I hope she's driving to work…...(and last but not least)…..Mazel Tov la sorellas…..weeeeeeeee!" Maria Crocco

"There is no one like Joan. I have been amazed and dazzled by her ever since I met her. The word feisty comes to mind; outrageous; fun; sensitive and kind all describe her. I will miss her a lot. No one makes me feel so good as Joan does. That quote from Maya Anjelou that Maria had on her email signature personifies Joan's approach to us all: "people will forget what you say or do but they will never forget how you made them feel." Something like that. I do not look forward to life here without her. I get previews when she takes vacations—there is always this big hole in our group psyche. I don't mean to gush but Joan deserves every bit of gushing I can give her! I wish her all the best as she enjoys her life with Jay—most people can look forward to another 1/3 of their life after retirement and I hope she has a ball."
Nancy Diener

...continued

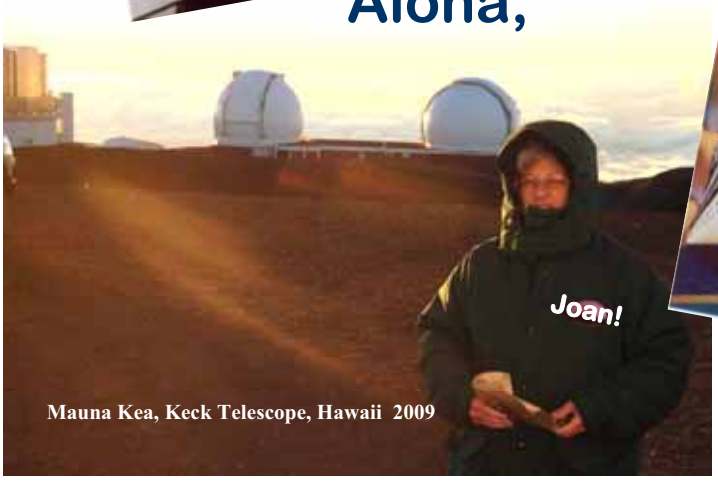
"Though I'm not in the National Academies year book I feel like I should be! To say it's been a pleasure working with Joan Rosenthal over the years is putting it mildly. She will truly be missed by me for her level headed professionalism in the midst of total chaos but more importantly I will miss her because she's just a REALLY, REALLY nice person. That's what makes it hard to say goodbye but easy to say Congratulations! Enjoy every day! Sincerely, Linda Kahl, Omega Travel

"Joan has adventures and shares them with others. Once when on a walk with Chris O'Brien, she stopped to tie her shoes on the steps of a house in Georgetown, and before she finished, Henry Kissinger walked out. She got Tom Hank's autograph at the Beckman Center. She has pictures of innumerable presidents and movie stars that she took on the sly. I never encounter celebrities, but while with Joan, I saw Spike Lee, Ted Kennedy, and our own Ford Fellow celebrity, Julianne Malveaux. But it is not just the fun that has defined Joan and her success at the National Academies for more than 35 years—she is the quintessential professional, who always plans ahead and attends to every meeting detail. I already miss Joan and I know others will soon do the same." Peggy Petrochenkov

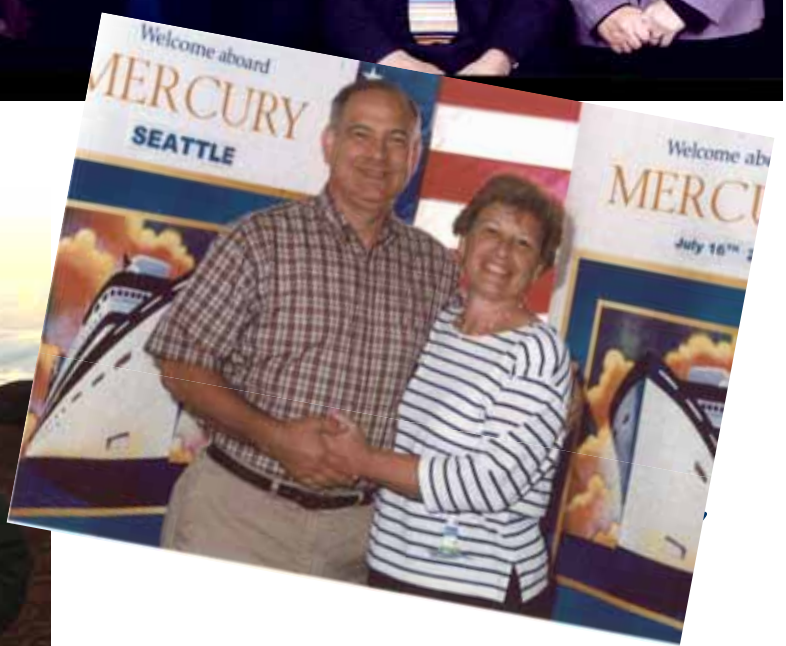
"This Philly girl has had the pleasure of working with Jersey Joan for her entire career. When I think about working with Joan, either in my days as a panel assistant or now working in meetings, one phrase comes to mind—The Devil is in the Details. I love that trait in Joan, she appreciates all the small efforts and tasks that make up the big picture. No question is too stupid, no issue is too small for her thoughtful consideration. Joan and I have gone to battle over some topics, like how long those file cabinets have to occupy the panel rooms, as I try and steal more space back from panels for other meetings. But we confront each other in true Philly/Jersey fashion and come to a decision we can both live with. We have laughed over all the characters that have worked on our operations over the years, we really should have written The Office, but we were too busy with our day jobs, I think. I will miss her kindness, compassion and great sense of humor. It is people like Joan who make our work lives interesting and fun. Have a blast in retirement, Joan. It's been a great ride. See you on I-95 or the boardwalk. Love, Eileen Milner

"It has been enormously rewarding to work with Joan for the last dozen years in PGA. While that is a small fraction of Joan's overall service to the Academy, it was enough to confirm her clear commitment to the Academy, to the Associates, and to the role of research in the nation's future. Her friendship with me and her collegiality across the division have been indispensible contributions to the daily lives of PGA. She will be missed but goes with our best wishes for a fulfilling retirement." Rich Bissell, Exec. Director

Aloha,



Mauna Kea, Keck Telescope, Hawaii 2009



2012 SCHEDULE

February Review

February 1	Application deadline
February 15	Support doc deadline
March 12-13	Panels/Review Board
March 20	Results available to applicants

August Review

August 1	Application deadline
August 15	Support doc deadline
Sept 21	Review Board
Sept 28	Results available to applicants

May Review

May 1	Application deadline
May 15	Support doc deadline
June 22	Review Board
June 29	Results available to applicants

November Review

Nov 1	Application deadline
Nov 15	Support doc deadline
January 7, 2013	Review Board
January 14	Results available to applicants

From the NRC new LinkedIn site, we sent you …

…individual e-mail invitations to join your agency's LinkedIn group.

Please join!

http://www.linkedin.com/groups?gid=4109187&trk=hb_side_g