

Undergraduate and Ronald E. McNair Research Conference



Thursday, June 1, 2006

8:00 am – 4:00 pm

Registration and Refreshments at 8 am

**Smith Memorial
Student Union**

Portland State University

1825 SW Broadway

Rooms 327, 328, & 329

All undergraduates, graduate students, and faculty from Portland State University and campuses in the area are encouraged to attend.

Please visit www.mcnair-program.pdx.edu

For the conference agenda and list of presentation abstracts

Conference Registration is free!

The Ronald E. McNair Post-Baccalaureate Program is funded by a Four-year \$880,000 US Department of Education grant and PSU cost-share funds.

**Undergraduate and Ronald E. McNair Research Conference
Portland State University**

*Thursday, June 1, 2006
Smith Memorial Student Union, Rooms 327, 328, 329*

8:00 am – 8:30 am

Registration and Refreshments
SMSU 327-329

8:30 am – 8:45 am

Opening Remarks, Terrel L. Rhodes
Vice Provost for Curriculum and Dean of Undergraduate Studies
SMSU 327-329

8:45 am – 9:00 am

Program Overview
SMSU 327-329

9:15 am – 10:15 am

Our Lives and Minds: The Psychological Impacts of Experiences

Session 1-A, room SMSU 328

Moderator: Sue Pesznecker

Audrey Jones, McNair Scholar

“Native American Veterans and Post-Traumatic Stress Disorder”

Teresa Moen

“Maternal Stress Reactivity: Associations with Temperamental Difficulty Ratings”

Goal Auzeen Saedi

“Perfectionism and Psychological Well-Being in Iranian-American College Students”

Donna Harris, McNair Scholar

“How Did the Psychological Impact of Banishment, the Stigma of Leprosy, and Isolation from Family Affect the Socialization of Children that were Incarcerated at the Kalaupapa Peninsula?”

9:15 am – 10:15 am

Engineering and Sustainable Solutions for a Better World

Session 1-B, room SMSU 329

Moderator: Shanna Eller

Ivan Perez Carrasco, McNair Scholar

“Nicaragua Project: Building Engineering Projects in Developing Countries for the Sake of Building a Better World”

Melissa Lindsey, McNair Scholar

“Conventional versus Alternative Waste-water Treatment”

Shawn Black

“Comparing Older and Younger Subjects’ Flexibility when Performing Simple Job Tasks”

L. John Ledesma

“Microfluid Pump-based Drug-delivery Systems”

10:30 am – 11:30 am

Beauty and Understanding through Arts and Literature

Session 2-A, room SMSU 328

Moderator: Jack Straton, PhD

Chandra Jordan

“Diego Velazquez and His Representation of Court Jesters”

Cassie Miura & Rian Snider

“Ekphrasis in Book Eight of Virgil’s *Aeneid*”

Janette Crume-Centeno, McNair Scholar

“Klamath Rock Art”

Marie Loeb, McNair Scholar

“Excerpt from the Documentary *Queen of Heart: Community Therapists in Drag*”

10:30 am – 11:30 am

Innovations in Mathematics and Science

Session 2-B, room SMSU 329

Moderator: Matthew Hein

Lori Noice, McNair Scholar

“Gallium Nitride Calcined with Copper Oxide: Structural and Spectrographic Studies”

Susan E. Holmes

“Community Fingerprinting and Biogeochemistry of a Microbial Community of Extreme Oligotrophic Acidophiles”

Sonya Redmond

“Students’ Strategies for Extracting Meaning from Formal Mathematical Statements and Translating Them into Informal Language”

Lunch break from 11:45 am – 1:00 pm

1:15 pm – 2:15 pm

Applied Linguistics and Real-World Situations

Session 3-A, room SMSU 328

Moderator: Matt Geraths

Katrina Pariera, McNair Scholar

“An Introduction to Politeness Theory”

David Potter, McNair Scholar

“Lexicalized Tree Adjoining Grammar: An Overview”

Brandon Dickinson

“Bilingual Lexical Retrieval”

Joshua Seaman

“The Role of Subvocalization in Reading Comprehension”

1:15 pm – 2:15 pm

Deconstructing the Status Quo: Exploring Issues of Equality and Justice

Session 3-B, room SMSU 329

Moderator: Tina Burdsall

George Andrada

“Oregon’s *Measure 5*”

Mary Fletcher, McNair Scholar

“Hate Crimes and Homophobia: Their impact on the ‘Coming Out’ experience of LGBT youth in rural areas”

Cat Goughnour, McNair Scholar

“Preliminary Research on Ida B. Wells: Fight for Social Justice 1890 – 1900”

2:30 pm – 3:30 pm

Resistance and Change: The Dynamics of Power and People

Session 4-A, room SMSU 328

Moderator: Laurel Shonerd

Sascha Krader

“Non-violence Tactics”

Clare Washington, McNair Scholar

“African Resistance to Slavery in the Americas: The Myth of the ‘Sambo Syndrome’”

2:30 pm – 3:30 pm

New Developments at Nano Frontiers

Session 4-B, room SMSU 329

Moderator: Toeutu Faaleava, PhD

Steven Youkey

“Effects and Length of Local Joule Heating on the Electrical Resistivity of Carbon Nanotubes”

Jennifer Jones

“Fabrication and Characterization of Carbon Nanotubes Synthesized via Chemical Vapor Deposition and Plasma-enhanced Chemical Vapor Deposition”

Noel Tavan

“Pattern Growth of Carbon Nanotubes Bundles”

Special thank you to:

President Daniel O. Bernstine
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Terrel L. Rhodes, Vice Provost for Curriculum and Dean of Undergraduate Studies
The Department of English at Portland State University
The Center for Excellence in Writing
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Sally Brauckmiller
Sharon Buhlinger
Grace Dillon, PhD
Tracy Dillon, PhD
Elizabeth Dillon
Office of Academic Affairs
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Students Leaders for Service

Conference Planning Committee and Volunteers:

Grace Dillon, Assistant Professor, University Studies
Toeutu Faaleava, Director of the McNair Scholars Program
Jolina Kwong, Coordinator of the McNair Scholars Program
Amrina Sugaipova, Graduate Assistant for the McNair Scholars Program
Jane Anau, McNair Scholar
Katrina Pariera, McNair Scholar
Angie Mejia, McNair Scholar
Tamam Waritu, McNair Scholar
Mary Fletcher, McNair Scholar
Andrea Winters, McNair Scholar
Holly Hernandez, McNair Scholar
Carrie Cobb, McNair Scholar

McNair Scholars Program Information

Office Location: Smith Memorial Student Union, M314

Telephone: 503-725-9740

Email: remcnair@pdx.edu

Website: www.mcnair-program.pdx.edu

The Ronald E. McNair Scholars Program at Portland State University works with students who want to pursue PhDs. It introduces juniors and seniors who are first-generation and low-income or members of under-represented groups to academic research and to effective strategies for getting into and graduating from PhD programs.

The McNair Scholars Program has academic-year activities and a full-time summer research internship. Scholars take academic and skills-building seminars and workshops during the year, and each scholar works closely with a faculty mentor on original research in the summer. Scholars present their research findings at the McNair Summer Symposium and at other conferences, and are encouraged to publish their papers in the [McNair Journal](#) and other scholarly publications.

The Ronald E. McNair Post-baccalaureate Achievement Program was established in 1986 by the U.S. Department of Education and named in honor of Challenger Space Shuttle astronaut Dr. Ronald E. McNair.

The Ronald E. McNair Post-Baccalaureate Program is funded by a Four-year \$880,000 US Department of Education grant and PSU cost-share funds.

Funding for this conference was provided by the Ronald E. McNair Post-Baccalaureate Program and the Department of English at PSU.

Please visit www.mcnair-program.pdx.edu, for the conference agenda and list of presentation abstracts.

Presentation Schedule and Abstracts

Our Lives and Minds: The Psychological Impacts of Experiences

Session 1-A

9:15 am – 10:15 am, SMSU room 328

Moderator: Sue Pesznecker

Audrey Jones, McNair Scholar

“Native American Veterans and Post-Traumatic Stress Disorder”

Our presentation will explore family stress associated with Post-Traumatic Stress Disorder found in military families of combat and/or peacetime veterans. Emphasis will be placed on Native American veterans and their families. First, we will give a brief historical background of American Indian involvement in the United States Armed Forces. Using an ABC-X model of family stress theory, we will identify family stress issues specific to military families. To illustrate pile-up experienced by American Indian families, we will introduce at least one concept associated with mundane extreme-environmental stress. Next, we will define PTSD and describe some common symptoms experienced by combat veterans. Finally, we will highlight compassion fatigue and conclude our presentation with health service use among Native American Veterans.

Teresa Moen

“Maternal Stress Reactivity: Associations with Temperamental Difficulty Ratings”

In an extended program of research, Bugental and her colleagues have found that parental attributions impact stress reactivity in care-giving interactions. Specifically, those parents who believe that they are at a power disadvantage with respect to their children respond to care-giving challenge with autonomic and adrenocortical arousal. There is also evidence that these parental attributions impact perceptions of child temperamental difficulty. In the current study, we are examining whether or not perceptions of temperamental difficulty, rather than “objective” child difficulty, are driving parental adrenocortical responses. Nineteen infants were coded for temperamental difficulty during a laboratory visit by trained observers and these data were compared to maternal ratings of temperamental difficulty as assessed by the Toddler Behavior Assessment Questionnaire. Maternal adrenocortical response was also assessed. Preliminary results suggest that maternal adrenocortical response is related more strongly to maternal perceptions of difficulty than to “objective” assessments of temperament.

Dr. Gabriela Martorell, faculty sponsor.

Goal Auzeen Saedi

“Perfectionism and Psychological Well-Being in Iranian-American College Students”

Research has suggested there are correlations between high levels of perfectionism and various forms of psychopathology. College students are a population in which these forms of psychopathology are particularly prevalent. Furthermore, perfectionism and psychological distress have been linked in some collectivistic cultures. Iranian-Americans are a collectivistic culture and have been noted as depressed. However, the link between Iranians’ mental health and perfectionism has yet to be established. Additionally, many Iranian mental health investigations are geographically homogenous. This study attempts to increase the knowledge regarding Iranian college student mental health in the Pacific Northwest while examining their perfectionism levels.

Dr. Todd E. Bodner, faculty sponsor.

Donna Harris, McNair Scholar

“How Did the Psychological Impact of Banishment, the Stigma of Leprosy, and Isolation from Family Affect the Socialization of Children that were Incarcerated at Kalaupapa Peninsula?”

From 1866 to 1969, more than 8,000 people were forcibly incarcerated at Kalaupapa Peninsula on the island of Molokai after they were diagnosed with leprosy (Hansen’s Disease). Of those 8,000 patients, nearly half were between the ages of 11 and 25 with the youngest being 1 year old. The purpose of this research is to provide insight from the children’s point of view. When I began researching the colony, I did not find research that was conducted specifically about the children who were exiled to the colony and who were among thousands of patients who died

there. The significance of this project is to provide a history of these children and to improve our understanding of the sociological impact that diagnosis and isolation from family had on these young patients. Data will be collected from publications, taped oral histories from patients and caretakers which are already on file with the National Park Services Museum in Molokai, the State of Hawaii Health Department, the CDC and oral histories from the survivors who remain in the colony.

Engineering and Sustainable Solutions for a Better World

Session 1-B

9:15 am – 10: 15 am, SMSU room 329

Moderator: Shanna Eller

Ivan Perez Carrasco, McNair Scholar

“Nicaragua Project: Building Engineering Projects in Developing Countries for the Sake of Building a Better World”

Engineers without Borders (EWP) helped rebuild the infrastructure of New Orleans after Katrina. After the first year, it broadened its horizon to developing countries in Asia, Africa, and Latin America. The EWP student chapter at Portland State began this year working on engineering designs that were implemented in various places in Nicaragua. EWB aids specific populations in Nicaragua by assessing their problems and creating possible projects for future development.

This year, EWB assessed problems in various elder-care facilities, and determined possible future projects and how to minimize costs. EWB has various research projects that can be done by engineering students during their undergraduate studies. One of these research topics is finding effective ways of using local material to implement engineering designs. Another is an investigation of possible collateral changes to the culture due to the use of foreign design.

Using local material to build minimizes project costs and reduces uncertainties that may occur within the country. It also helps the local economy by hiring local workmen familiar with the use of local materials. In case of any damage to the structure, it can be easily repaired if the material damaged is a recognized local one.

These types of projects also introduce new ideas to the community, which may have positive and negative effects. Many of the engineering designs done in the USA and other developed countries are based on more advanced technology not yet utilized in third-world countries. One example is from this year’s project. Many residents and staff at the elder-care facilities could not understand why a water tank at ground level was delivering water through a pump to another water tank at a higher elevation. To engineers, it is a simple design based on engineering principles, but to the people living there, it was a new concept that they did not comprehend completely. How does this new concept affect their ways of thinking? More importantly, is it recommendable for international engineers to implement engineering designs that are unsuitable for the local community?

Melissa Lindsey, McNair Scholar

“Conventional versus Alternative Waste-water Treatment”

The process of sewage drainage is a necessity in terms of maintaining public and private sanitation. Over time, cities and populations have grown and conventional drainage methods have accommodated them, yet not without problems. Maintenance and repair to sewage facilities pose high costs. Population growth will not cease and the need for sewage systems will remain steady. As prices rise, perhaps more investment will go into methods that are more cost-effective. Research and investment in alternative wastewater treatment facilities have become more popular in the United States. These methods are commonly used in other parts of the world and have proven less monetary and energy intensive.

Shawn Black

“Comparing Older and Younger Subjects’ Flexibility when Performing Simple Job Tasks”

There is a variable significance between older and younger subjects’ flexibility when performing simple job tasks involving sitting and standing, on an everyday basis. Through intensive data collecting, interviews and record keeping, I will present my findings from the comparative analysis.

L. John Ledesma

“Microfluid Pump-based Drug-delivery Systems”

Both acute and chronic psychological and social stresses can impair reproductive hormone secretion in a variety of primate species. Adrenocorticotropin hormone (ACTH) is the primary endocrine hormone peptide, which triggers the release of cortisol/corticosterone in response to a stress stimulus. In order to reduce marked differences between individuals' responses to stressors, we are proposing the development of a microfluidic-based pump system for stress response monitoring and analysis. We have begun studies of microchannel fluid flow using multiphysics modeling (ANSYS) with promising results. Microfluidic devices obviate the factors and variables that a living organism employs to elicit a stress response.

Lemmy Meekisho, Ph.D., Shalini Prasad, Ph.D., Engineering & Computer Science Department

Beauty and Understanding through Arts and Literature**Session 2-A**

10:30 am – 11:30 am, SMSU room 328

Moderator: Jack Stratton, PhD

Chandra Jordan

“Diego Velazquez and His Representation of Court Jesters”

Spanish 17th century court painter Diego Velazquez used his depictions of jesters, actors and dwarfs to express and explore character, mood and the human condition. Diego Velazquez painted court entertainers of the baroque era with dignity and humanity. This attention to their character is personified in the portrait of *The Buffoon Pablo de Valladolid*. This paper proposes that the usage of the word "buffoon" in the title is not a true reflection of the subject in the painting. The paper puts forth the question to the reader to consider whether Velazquez's painting *The Buffoon Pablo de Valladolid* is of a buffoon or that of a court performer.

Cassie Miura & Rian Snider

“Ekphrasis in Book Eight of Virgil's *Aeneid*”

This is a co-authored paper and presentation reflecting a broader research project. For the paper, we will concentrate on the ekphrasis in book eight of Virgil's *Aeneid* where Virgil describes the shield of Aeneas. We will offer a close reading and technical inspection of the passage from 8.625-728. The paper will provide a general definition of ekphrasis, an explanation of how it functions in the text, and comments on modern theoretical perspectives relevant to our discussion.

Janette Crume-Centeno, McNair Scholar

“Klamath Rock Art”

Marie Loeb, McNair Scholar

“Excerpt from the Documentary *Queen of Heart: Community Therapists in Drag*”

Queens of Heart: Community Therapists in Drag is a feature-length documentary, written by Jan Haaken and co-directed by Jan Haaken and Wendy Kohn, which uses queer theory, psychoanalytic theory, pop culture, and a revolutionary narrative structure, replacing “talking heads” with psychoanalytic-inspired title cards to show Darcelle, a seventy-five year old drag queen, and the other performers as community psychologists. The film is divided into seven sequences: Hysteria, Castration Anxiety, Gender Complexes, Countertransference, Occupational Stress, Loss and Mourning, and Working It Through. “Gender Complexes,” which examines the spectrum of gender identity through interviews from community members and performers from *Darcelle XV's*, will be presented.

Innovations in Mathematics and Science

Session 2-B

10:30 am – 11:30 am, SMSU room 329

Moderator: Matthew Hein

Susan E. Holmes

“Community Fingerprinting and Biogeochemistry of a Microbial Community of Extreme Oligotrophic Acidophiles”

Question: We will measure species diversity (16S/18S rDNA phylogeny), overall growth rate, and energetic physiology of communities of extreme oligotrophic acidophiles. **Reason:** This research will allow greater understanding of microbial endoliths from subsurface acid rain-fed andesitic silicates. **Findings:** We achieved controllable and measurable growth under laboratory conditions. The presence of Prokaryotes and Fungi was shown by optical and electron microscopy. **Conclusions:** This microbial community is probably supported by chemolithotrophic Prokaryotes. **Implications:** Subsurface communities at silicate-water interfaces may be more complex and dynamic than previously thought. **Support:** This research is supported by funds from Dr. Radu Popa’s laboratory at PSU.

Sonya Redmond

“Students’ Strategies for Extracting Meaning from Formal Mathematical Statements and Translating them into Informal Language”

The purpose of this paper is to describe the results of a study exploring students’ strategies for extracting meaning from formal mathematical statements and translating them to informal language. In this context, we define a strategy to be a method or procedure, regularly employed by students. We describe and compare the strategies employed by three undergraduate advanced calculus students during individual interviews. In particular, we investigate the extent to which students’ strategies rely on the syntax of the statements that they are trying to interpret. Finally, we offer conjectures as to why students employ the strategies that they do.

Lori Noice, McNair Scholar

“Gallium Nitride Calcined with Copper Oxide: Structural and Spectrographic Studies”

Although GaN doped with certain transition metals is predicted to attain Curie temperatures above room temperature (Dietl, et al., *Science* **287** (2000) 1019), the potential of Cu-doped GaN as a dilute magnetic semiconductor remains largely unexplored. Therefore, several samples of GaN calcined with CuO were analyzed via powder X-ray diffraction, transmission electron microscopy, energy dispersive X-ray spectroscopy, and electron energy loss spectroscopy in order to address their structural characterization. Gallium oxide and multiple copper oxide phases were detected. Significant changes in some GaN lattice parameters and electron structure indicate incorporation of both copper and oxygen into the GaN lattice.

L. Noice[◇], B. Seiple¹, P. Moeck¹, C. Li¹, R. Enri², A. Gupta^{1,3}, N. Browning^{2,3}, K. Rao⁴

¹ Department of Physics, Portland State University, P.O. Box 751, Portland, OR 97207-0751, USA

² Department of Chemical Engineering and Materials Science, University of California at Davis, One Shields Avenue, Davis, CA 95616, USA

³ National Center for Electron Microscopy, Lawrence Berkeley National Laboratory, Berkeley, California 94720, USA

⁴ Department of Materials Science, Tmfy-MSE, The Royal Institute of Technology, Stockholm, Sweden

[◇] noice@pdx.edu

Applied Linguistics and Real-World Situations

Session 3-A

1:15 pm – 2:15 pm, SMSU room 328

Moderator: Matt Geraths

Katrina Pariera, McNair Scholar

“An Introduction to Politeness Theory”

This presentation discusses the general principles of Politeness Theory. Brown and Levinson's 1987 book, *Politeness: Some Universals in Language Usage* has been one of the most influential sociolinguistic texts of all time. In addition to an overview of their theory, the presentation will cover some of the more current work relating to Politeness Theory, such as that by Scollon and Scollon, as well as arguments which contradict some of Brown and Levinson's original claims. I propose that Politeness Theory is still a useful tool in research, but that it should continue to be critically examined and modified to account for observations.

David Potter, McNair Scholar

“Lexicalized Tree Adjoining Grammar: An Overview”

Lexicalized Tree Adjoining Grammar (LTAG) is a constrained mathematical formalism which can be used to model the syntax and semantics of natural languages. LTAG is a context sensitive grammar (CFG), in contrast to the modified context sensitive grammars used by many string rewriting formalisms. LTAG, with various constrained extensions such as D-LTAG and MC-TAG, model aspects of natural language which are impossible to model with CFGs. However, LTAG presents formal difficulties of its own. This paper explores the advantages and disadvantages of the LTAG formalism in terms of descriptive power and parsing properties.

Brandon Dickinson

“Bilingual Lexical Retrieval”

In the field of Psycholinguistics, the nature of the bilingual lexicon, the storage unit for lexical information, is still unknown. Do bilingual speakers store lexical items for both languages in one location (the lexicon), or are there two lexicons, which separately store the lexical information for each language? Ameel, Storms and Sloman (2005) have shown that bilinguals categorize lexical items differently than monolinguals and thus have two lexicons. However, these results may follow from cultural categorizational constructs and are not due to bilingualism. This paper proposes a research methodology that seeks to determine if, cross-culturally, bilinguals categorize lexical items differently. We compare the performance in a lexical decision task of two groups: bilingual Japanese/English speakers raised in America and bilingual Japanese/English speakers raised in Japan, using as control groups monolingual speakers of English raised in America and monolingual speakers of Japanese raised in Japan.

Joshua Seaman

“The Role of Subvocalization in Reading Comprehension”

This research confronts the issue of subvocalization, which is traditionally viewed by educators as a negative attribute and an indicator of poor reading ability. In contrast to these attitudes, recent research has shown that subvocalization may actually be a key factor in aiding the processes of reading comprehension. Through combining methodologies from previous experiments that used EMG to detect subvocalization, this research project is designed to make explicit and solid connections between comprehension and subvocalization, and to show a gradation of the two through multiple levels of reading difficulty.

Deconstructing the Status Quo: Exploring Issues of Equality and Justice
Session 3-B

1:15 pm – 2:15 pm, SMSU room 329

Moderator: Tina Burdsall

George Andrada

“Oregon’s *Measure 5*”

Oregon’s *Measure 5*, from 1990, was a constitutional amendment that cut property taxes and cut funding to public services. This measure was contested by a powerful opposition. This came in the form of a \$900,000 campaign from a political action committee called The Oregon Committee. A majority of this money came from The Oregon Education Association. The proponent’s side included Don McIntire and The Protect Oregon Property Society funded mainly by individual citizens. They ran a \$160,000 campaign, which ultimately succeeded in passing by the narrow margin of 574,833 to 522,022 votes.

Mary Fletcher, McNair Scholar

“Hate Crimes and Homophobia: Their impact on the “Coming Out” experience of LGBT youth in rural areas”

This is a qualitative study that utilizes in-depth interviews to detail the unique challenges experienced by queer youth in rural areas. These interviews provide detailed first-person narratives that explore the impact of limited resources and the stigma and stereotypes endured by queer youth. Queer youth can be forced to navigate the “coming out” experience in communities that sometimes foster hostile and unsafe atmospheres. This research will shed light on personal stories and the need for continued study of the coming out experience in urban areas and in rural environments.

Cat Goughnour, McNair Scholar

“Preliminary Research on Ida B. Wells: Fight for Social Justice 1890 – 1900”

In researching the significant human rights movements of the past 200 years, I was struck with the visionary work of Ida B. Wells. Born a free-Black in 1860, this woman, orphaned at 16 by Yellow Fever, began her life’s work speaking out against the brutality and inhumanity of lynching in the late 19th century. She continued her activism with anti-lynching campaigns in Briton during the 1890s. In addition to founding the NAACP and owning her own newspaper, Wells used her pen to demand the rights of post-Reconstruction African-Americans until her death in 1931. Though her political contribution to human rights was well documented by many of the now defunct African-American-owned newspapers, today, Wells’ accomplishments remain extraordinary and must be revisited. Wells was at the forefront of clubwomen groups, social justice movements of the 19th and 20th centuries and the NAACP. I will present a historical perspective, highlighting her political accomplishments in social justice.

Resistance and Change: The Dynamics of Power and People

Session 4-A

2:30 pm – 3:30 pm, SMSU room 328

Moderator: Laurel Shonerd

Sascha Krader

“Non-violence Tactics”

In the last six years, four governments (Serbia's, Ukraine's, Georgia's and Kyrgyzstan's) were overthrown -- all without the use of violence. The revolutions were all instigated by youth groups who mixed traditional nonviolent tactics (sit-ins, street theater) with unconventional tactics (graffiti, the use of marketing and focus groups). After overthrowing Milosevic in 2000, Serbia's *Otpor* recreated itself as a traveling revolutionary consulting firm, teaching the youth of Ukraine and Georgia how to bloodlessly topple their leaders. Is this all, as some believe, a Western plot? If not, what are the implications of these revolutions for practitioners of nonviolence worldwide?

Clare Washington, McNair Scholar

“African Resistance to Slavery in the Americas: The Myth of the ‘Sambo Syndrome’”

Statements made by white colonizers about the slaves' behavior, gave the general impression of slaves that accepted their enslaved status, and that even after emancipation, they preferred their previous status of bondage to freedom. Studies have shown, however, that this image of slaves was a misrepresentation of the true feelings of the enslaved Africans. The portrayal of Africans in the New World as being docile (the ‘Sambo Syndrome’) was insidious and misleading. Just because an enslaved man or woman didn't outwardly resist his or her bondage did not mean that the idea and/or thought hadn't crossed his or her mind.

New Developments at Nano Frontiers

Session 4-B

2:30 pm – 3:30 pm, SMSU room 329

Moderator: Toeutu Faaleava, PhD

Steven Youkey, Lifeng Dong, Dr. Jun Jiao

“Effects and Length of Local Joule Heating on the Electrical Resistivity of Carbon Nanotubes”

In the field of nanotechnology, single and multi-walled carbon nanotubes (SWCNTs and MWCNTs) are widely regarded as two of the best candidates for building electrical circuitry at the ultra microscopic level. However, there is still much that is unknown about the nanotubes' specific electrical characteristics, such as average resistivity. It has not yet been conclusively shown what effect the nanotube's length, in conjunction with local joule heating has upon these electrical characteristics. In this paper, I will describe methods of using dielectrophoresis to align SWCNTs on multi-finger platinum electrode patterns, so that their specific resistivities may be measured against, and compared to, their length and the local joule heating process. This was accomplished by suspending the SWCNTs in an SDS solution, using dielectrophoresis to align the nanotubes on the electrodes, visually characterizing the patterns in a scanning electron microscope, and then measuring the resistances on a microchamber probe station. Once the electrical characteristics of carbon nanotubes are well understood, we will become one step closer to being able to put SWCNTs and MWCNTs into the production of nanoelectronics.

Acknowledgements

The financial support for undergraduate students participating in this research was provided by the National Science Foundation's Research Experience for Undergraduates Program under Award Number DMR-220926 and the Portland State University Scholarly and Creative Activity Grant for Undergraduates.

Jennifer Jones, Jianfeng Wu, Dr. Jun Jiao

“Fabrication and Characterization of Carbon Nanotubes Synthesized via Chemical Vapor Deposition and Plasma-enhanced Chemical Vapor Deposition”

We report here a comparative study of Carbon nanotubes (CNTs) synthesized by both Chemical Vapor Deposition (CVD) and plasma-enhanced Chemical Vapor Deposition (PECVD) within the same reactor. Electron microscopy techniques have shown that CNTs produced by a thermal CVD method are randomly oriented and unaligned, with irregular tips. Growth by the PECVD method produces vertically aligned CNTs with no irregularity at the tips, due to the electric field in the plasma. A set of samples prepared with different parameters were characterized. The structural properties were compared and aimed at optimizing the growth conditions for fabricating CNTs with controlled morphologies.

Acknowledgements

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Noel Tavan, Dr. Jun Jiao

“Pattern Growth of Carbon Nanotubes Bundles”

Materials made of carbon nanotubes (CNTs) are some of the most promising resources of the future. Their structure and electrical properties have generated increasing interest over the last decade. CNTs possess numerous characteristics that are unique and may be used in myriad applications such as flat panel displays where low cost, as well as high pixel definition, is required. However, much work remains to be done to determine the most efficient and reliable way to use them. Toward this end, we have developed several test platforms using standard photo lithographic techniques. Each platform is based on a different pattern and is designed to test the electrical or mechanical characteristics of CNT structures. We will present electron microscopy analysis of several post-growth patterns as well as field emission data from CNT bundles contained within one of the platforms. The significance of patterned growth of carbon nanotubes in industrial applications will also be discussed.

Acknowledgements

The financial support for undergraduate students participating in this research was provided by the National Science Foundation's Research Experience for Undergraduates Program under Award Number DMR-220926 and the Portland State University Scholarly and Creative Activity Grant for Undergraduates.