

weSTEM 2015, University of Illinois in Urbana-Champaign

Surviving & Thriving in Graduate School

Bernadette A. Hernandez-Sanchez

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Advanced Materials Laboratory**

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Sandia is one of 17 National Laboratories

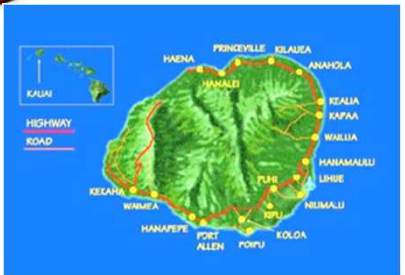


Federally Funded Research and Development Center (FFRDC)
Government Owned/Contractor Operated (GO/CO)

SNL's major facilities are located at Albuquerque, New Mexico; Livermore, California; and at a test near Tonopah, Nevada.

An aerial photograph of the University of Utah campus, showing various academic buildings, green spaces, and a large body of water in the background. The image is presented within a red circular frame.

SNL's major facilities are located at Albuquerque, New Mexico; Livermore, California; and at a test range near Tonopah, Nevada.



Kauai, Hawaii



Waste Isolation Pilot Plant, Carlsbad, New Mexico



188,300 acres.



Tonopah, Nevada



The Advanced Materials Laboratory Department, 1815

Department 1815 is located at the Advanced Materials Laboratory (AML) – a Sandia-leased facility on the campus of the University of New Mexico

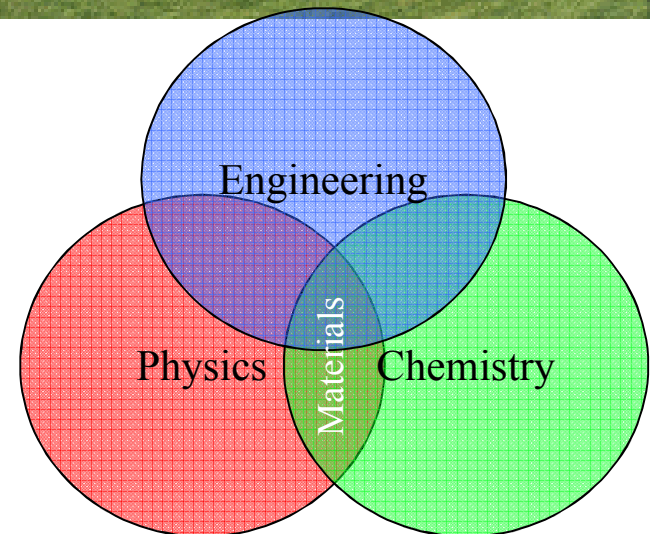
Research at the AML is focused on materials and process research in the areas of:

- **ceramics**,
- porous materials,
- catalysts,
- electronic materials,
- materials modeling,
- biomaterials,
- **synthesis**.

Strategic Advantages:

- Access to students
- Greater opportunity for collaborations with UNM faculty
- Access to campus resources – equipment, library, computer, etc.
- Funding sources not readily available to Sandia (NSF)
- Joint purchase of novel instrumentation

The Advanced Materials Laboratory, a part of Sandia National Labs since August, 1992



Developing materials science and engineering technology in the National Interest

AML Success Story: Bernadette Hernandez-Sanchez is a Chemist & Principal Member of Technical Staff at Sandia. She is also a program manager for Water Power's Materials & Manufacturing Reliability Program.



"My journey to become a chemist was initiated in high school through my hands on experiences at Sandia's AML. I extended my research experiences as undergraduate there because I had fun learning and being with my peers. As a post-doc, I saw how the national labs provided solutions to our nation's critical issues and was drawn to the possibilities of what I could achieve at Sandia. I love my research and still have fun today."



Manos ChemisTRY Program



Manos Volunteers

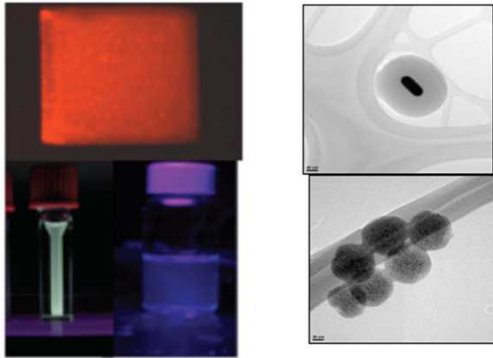




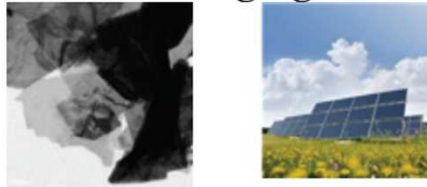
HERNANDEZ-SANCHEZ: Nanoparticles for Energy, Detection, & Interactions

Scintillators & Photonics

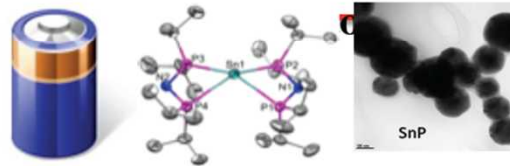
Understanding nanoscale radiation mechanisms & Uv-vis light interactions.



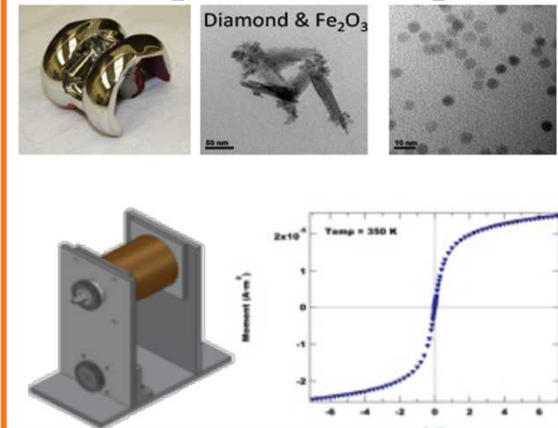
Chalcogenides Infrared Imaging or Solar



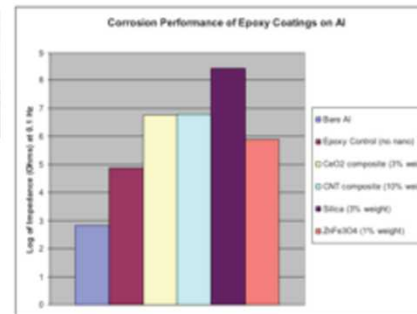
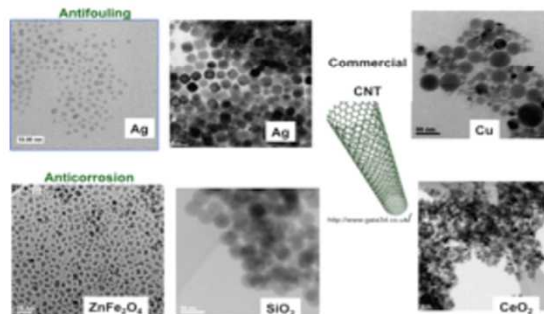
Phosphides Anodes, Magnets,



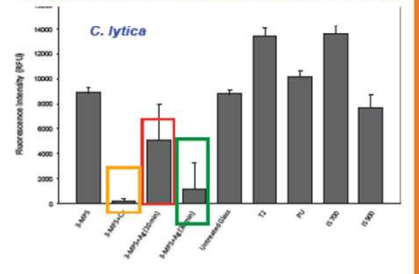
Magnetic Assisted Polishing Magnetic & Abrasive Particles to nanopolish knee implants



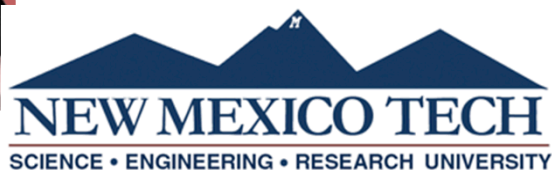
Protective Nanocoatings for Marine & Hydrokinetic Technology For the prevention of corrosion, biofouling, sediment erosion, and mineral fouling



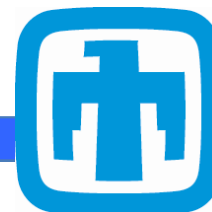
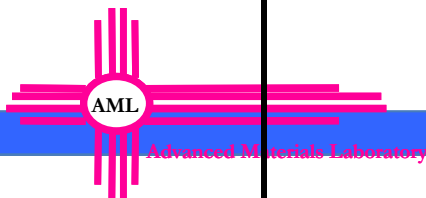
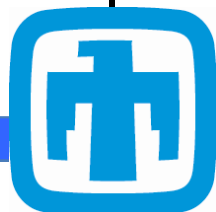
Evaluation of Bacteria Biofilm Growth



What Path did I Take?



Senior Member of
Technical Staff
2008-present



Rio Grande
High School
(1990-1994)

B.S. Chemistry
(1994-1999)
ACS Scholar

Ph.D. Solid State
Chemistry
(1999-2004)

Postdoc
(2004-2008)



T. J. Boyle



M.D. Heagy



E. R. Fisher & P. K. Dorhout



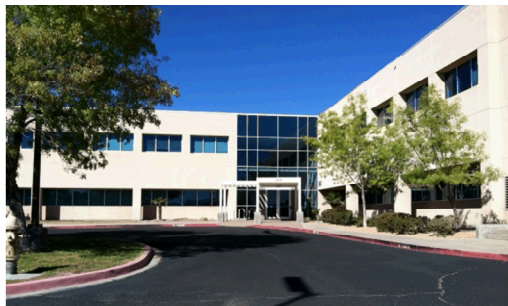
T. J. Boyle



W. F. Hammetter

Chemistry Rocks!

My First Introduction to an Inorganic Chemistry Lab



Schlenk Line



Glove Box



Chemistry was my extracurricular activity!

Undergraduate Laboratory Fun



Ready or Not Here I come-
Graduate School



Graduate School?





My Obstacles

- Passing metrics-cumulative exams, classes
- Time management (teaching/research/class)
- Family
- Can't do it alone
- Self-Doubt-Can I do this?
- Should I get a PH.D.? (visit www.shouldigetaphd.com)
- Motivation
- Grammar-keep practicing

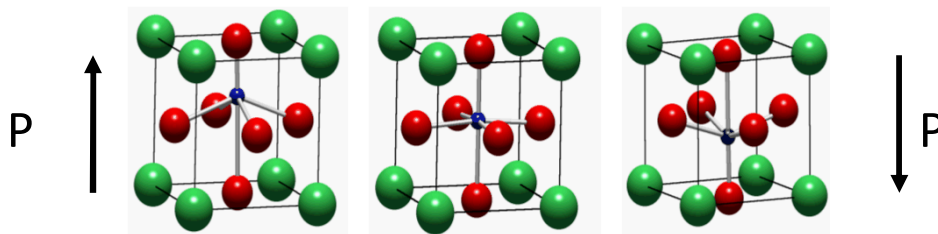
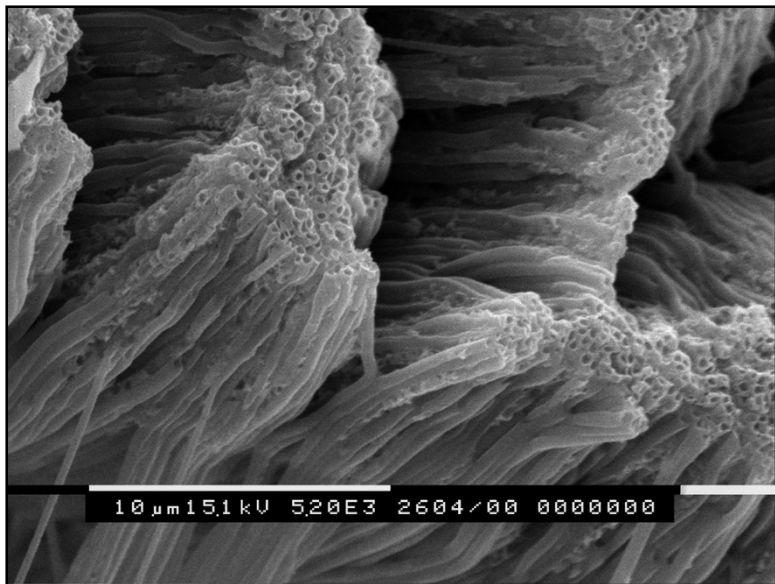
“You’re No Good to Me in Lab Unless you Pass your”

- Cumulative Examinations:
 - 2 week crash course:
independent study
 - Failed several
 - Asked for help!
 - Pay attention-great skill to
have for future proposals!
- Classes
- Time management
- Oral Examinations



Doctoral Research at Colorado State University

- Ph.D. Inorganic Solid State Chemistry w/ Profs: Peter K. Dorhout & Ellen R. Fisher



- Understand fundamental correlation between size & property
- Develop composite materials

Hernandez, B. A.; et al. *Chem. Mater.* **2002**, 14(2), 480–482.
Chang, K.-S.; et al. *J. Korean Chem. Soc.* **2002**, 46(3), 480–482.
Hernandez-Sanchez, B. A. Ph.D. Dissertation, Colorado State University, CO, **2004**
Hernandez-Sanchez, B. A.; et al. *Chem. Mater.* **2005**, 17 (24), 5909–5919.
Chang, K.-S.; et al. *Optical Materials*; Sept. **2007**; vol.30, no.1, p.132-4



Plasma Deposition

Traditional Solid
State Synthesis



Hydrothermal
&
Solvothermal

Life Happens, Life Goes On

- My little sister
- I got married
- Supportive family, friends, and mentors
- Life outside the lab



Thrill of Discovery

- 52nd Meeting of Nobel Laureates
- U.S. Delegation Member 1 of 27
- Washington, D.C.
- Lindau, Germany (400 attendees)
- Inspirational
 - Science, ethics, education, politics, religion
 - Prof. Dr. Ahmed Hassan Zewail
 - “Thrill of Discovery”
- Motivation and reminded me of why I chose to study chemistry & pursue my Ph.D.





Writing up?

Breath! You'll Get Through it!

- Sharing your thrill of discovery can be painful if you let it overwhelm you.
- Start small
- Data → write up a small fig caption → small paragraph.
- Write gibberish if it gets the juices flowing.
- Sometimes you gotta get out of lab & work with what you got.

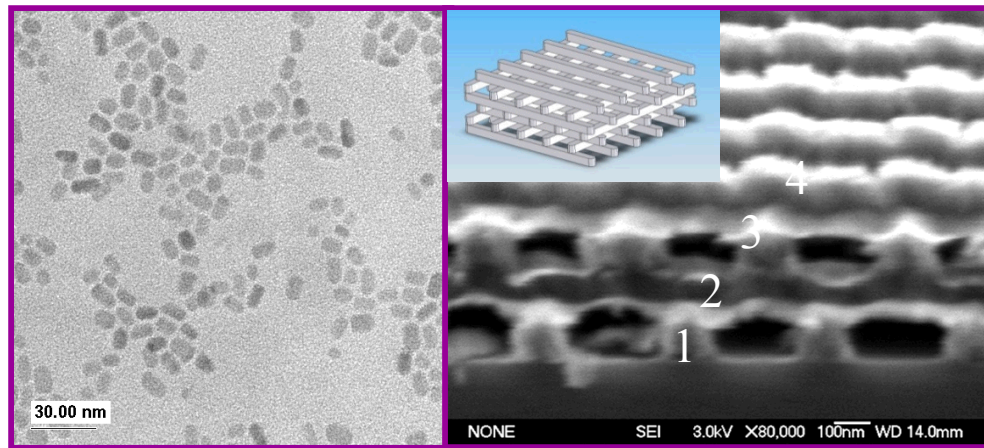


Your Mission for Success

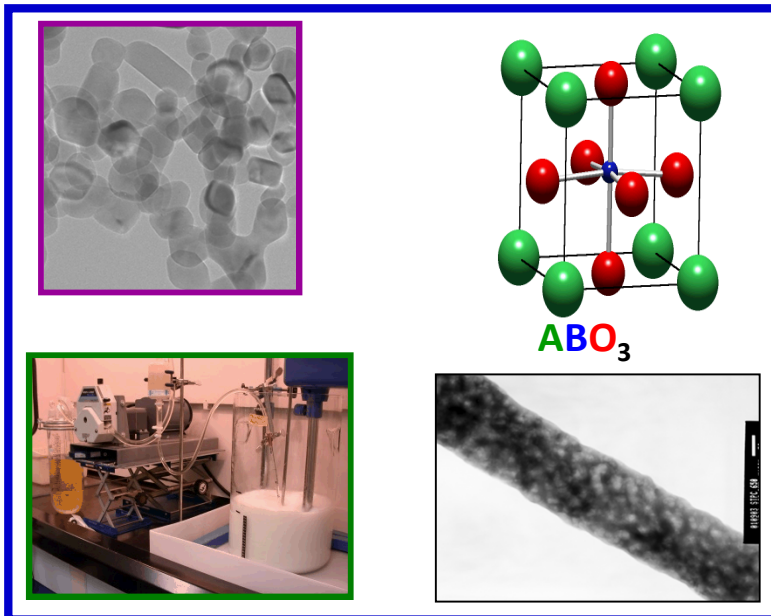
- Present at National Meetings
- Publish
- Professional Development Workshops
- Proposal Writing
 - Ask to help with and read proposals
- Peer Review
- Volunteer & Lead (once in a while)
- Network-for that next opportunity

Postdoctoral Research at Sandia National Laboratories

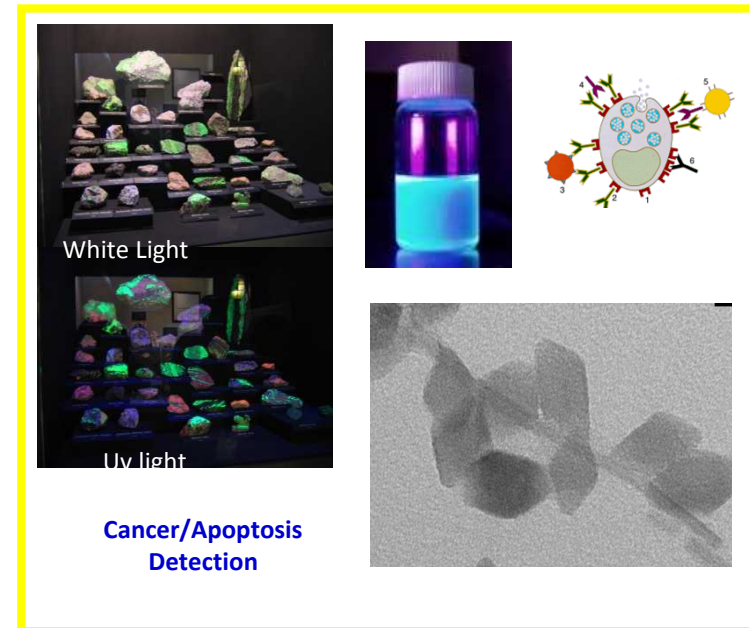
Photonic Crystal Devices (I)



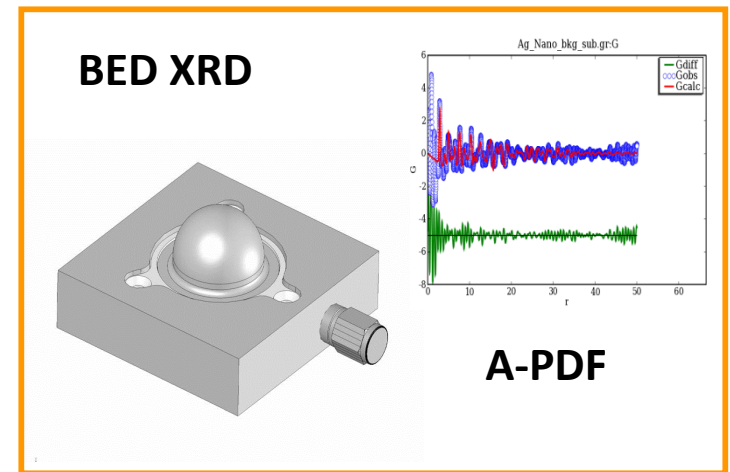
Electroceramics (III)



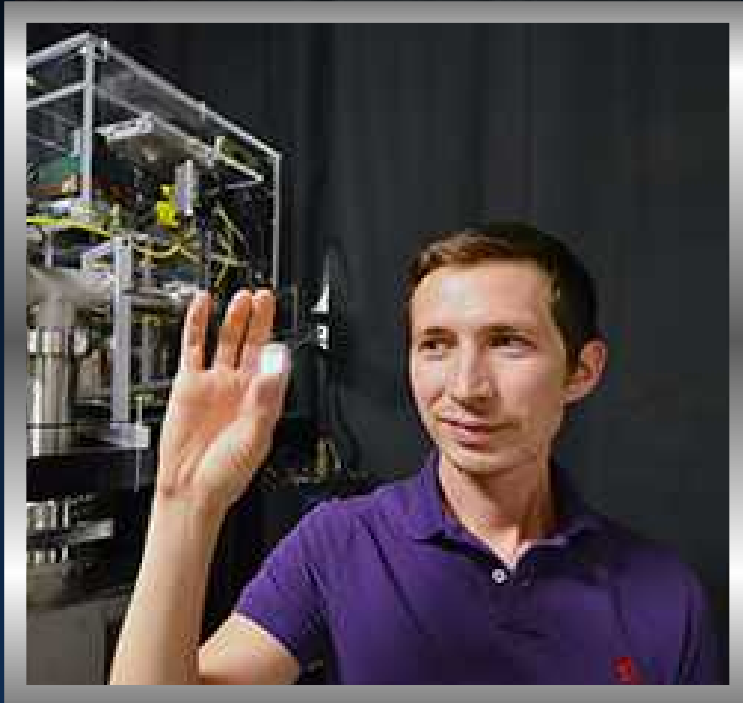
Non-Toxic Probes (II)



Characterization (IV)



Post-doc opportunities



Key areas for postdocs at Sandia:

- Biosciences and biotechnology
- Chemistry and materials science
- Combustion
- Computational mechanics
- Computer science
- Hydrogen
- Microelectronics and microfluidics
- Nanotechnology
- Physics

Requirements

- Min. cumulative GPA (3.5 Undergrad/3.7 Grad)
- U.S. citizenship
- A recent PhD (awarded within the past three years) or the ability to complete all PhD requirements before beginning
- No previous postdoc appointments at a national laboratory

Truman Fellowship for Postdoctoral Researchers

http://www.sandia.gov/careers/students_postdocs/fellowships/truman_fellowship.html

Internships



Encourages qualified students to develop interests in critical skills areas related to our mission, with the ultimate objective of developing our pipeline for our future. Available for Summer, Year Round and Co-op.

Requirements

- Min. cumulative GPA (3.2 Undergrad/3.5 Grad)
- U.S. citizenship
- Full-time enrollment status at an accredited college, university, or local high school
- At least 16 years of age





You're Stronger Than You Think!

- Seek help when you need it.
- Surround yourself with supportive people.
- Remember the Thrill of Discovery & Share it!
- Practice your communication skills
- Have Fun!
- Opportunities are coming!



Dorothy Hodgkins



Graduate School?



THANK YOU!



ACS
Chemistry for Life®

Scholars Program

**Dr. Timothy J.
Boyle
SNL**



**Professor
Michael D. Heagy
NMT**



**Professor
Ellen R. Fisher
CSU**



**Professor
Peter K. Dorhout
CSU**





Sandia Student & Postdoctoral Resources

Student Internship & Postdoctoral Positions

http://www.sandia.gov/careers/students_postdocs/postdocs.html

Truman Fellowship for Postdoctoral Researchers

http://www.sandia.gov/careers/students_postdocs/fellowships/truman_fellowship.html

