WILLIAM F. FINNEY, PhD

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EDUCATION

PhD in Chemistry, August 2002
Syracuse University, Syracuse, NY.
Dissertation: " Noninvasive In Vivo Tissue Modulated Quantitative Raman Spectroscopy of Human Blood"

BS in Chemistry, May 1997
SUNY Binghamton, Binghamton, NY.

CURRENT POSITION

Professor of Chemistry and Physics, Central Wyoming College; Riverton, WY, August 2019 – Present.

PROFESSIONAL APPOINTMENTS

Associate Professor of Chemistry and Physics, Central Wyoming College; Riverton, WY, August 2016 – August 2019.

Assistant Professor of Chemistry and Physics, Central Wyoming College; Riverton, WY, August 2013 – August 2016.

Instructor of Chemistry and Physics, Central Wyoming College; Riverton, WY, August 2010 – August 2013.

Visiting Assistant Professor, Department of Biological, Chemical and Physical Sciences, Illinois Institute of Technology; Chicago, IL, August 2006 – May 2007.

Sr. Research Associate, Department of Biological, Chemical and Physical Sciences, Illinois Institute of Technology; Chicago, IL, January 2006 – August 2006.

Postdoctoral Research Fellow, Department of Chemistry, University of Michigan; Ann Arbor, MI, August 2002 – November 2005.

AWARDS & HONORS

Innovative Educator of the Year, Central Wyoming College (2023-2024).
Rustler Spirit Award, Central Wyoming College (2022).
Megger's Award, Society for Applied Spectroscopy (2006).
Outstanding Graduate Teaching Assistant Award, Syracuse University (1999).

TEACHING & RESEARCH INTERESTS

Too frequently, particularly in the sciences, different disciplines are taught to students in a vacuum. In doing this, students learn to think that these are unrelated, isolated subjects. Chemistry and physics do have different philosophies, and use different methodologies to explain the world around us. The line between these two disciplines, however, has never been sharp and since the development of quantum mechanics these two fields have grown to share even more ground.

The concepts and content we teach in our introductory courses in these subjects overlap significantly. In my classes I work to apply what they learn in one class to help them better understand what they are learning in another. Much work in the sciences is now highly interdisciplinary, as exampled by my own research. Most of our students will be working not directly in the sciences, but in allied disciplines, such as medicine or engineering. The ability to take these different viewpoints from different disciplines and assemble them into one, consistent explanation of the world is critical.

Additionally, students need to learn to take data they collect and turn it into more intelligible graphs and figures and to build models to predict the behavior of complex systems. Whether it is incorporating the use of ubiquitous spreadsheet software to teach students to make graphs with predictive trendlines, writing their own code to create models of physical systems or using highly specialized ab-initio computational chemistry software to go from the structure of a molecule to predict the IR or NMR spectrum, students need to learn about the computational tools that are available to them. They need to learn how to decide which of the tools is best for a particular task and what are their limits. This allows them to move from exploring fundamental principles and sometimes overly simplistic systems to engaging real-world problems.

My research interests have been in exploring how physical methods can be applied to biomedical systems and problems. As a graduate student I applied molecular spectroscopy to develop a non-invasive method to monitor blood glucose concentrations. As a postdoc I studied the behavior of bone as a biomaterial. I applied methods used in materials testing and Raman spectroscopy to better explain the bulk mechanical properties of bone at a molecular level. Also, I helped develop a method to use Raman spectroscopy, which is traditionally though of as a surface technique, to probe sub-surface materials – like bone underneath skin and muscle. This method has a wide range of applications in engineering and medicine. Throughout this work, I have used a variety of software packages and programming languages to help collect and reduce data to clearly illustrate the behavior of these systems.

As CWC's INBRE Project Lead/Network Institution Coordinator, I have lead a group of 6-10 CWC faculty providing undergraduate research experiences to CWC students, networking for my colleagues throughout the state and in our region, and providing opportunities to integrate research methods and tools into our introductory college classes. Additionally, I lead a group of students participating in the Nationwide Eclipse Ballooning Project, where we launched high altitude balloons in conjunction with the October 2023 annular eclipse and the April 2024 total eclipse. I coordinated activities between our team and two other Wyoming teams participating in this project, building partnerships with project leadership at Montana State University and beyond.

Working to expand our reach into the greater Fremont County community, I serve as the Director of the West Central Regional Science Fair. Our fair covers an area that approximates the service area of our college and provides a pathway for middle and high school students to qualify to participate in the Wyoming State Science Fair. I recruit teachers and other community mentors, training them to mentor a science fair project, and train local STEM professionals judges in coordination with the WSSF.

TEACHING EXPERIENCE

At Central Wyoming College:

ASTR 1050 – Survey of Astronomy (FA23, FA24, FA25)
MATH 500 – Fundamentals of Arithmetic (FA10)
MATH 600 – Fundamentals of Algebra (FA10 & SP11)
CHEM 1000 – Introduction to Chemistry (FA16, SP17, SP21, FA21, SP22, SP26)
CHEM/PHYS 1090 – Fundamentals of the Physical Universe (each Spring from SP16 to present)
CHEM 1020 – General Chemistry I (each Fall from FA10 to present)
CHEM 1030 – General Chemistry II (each Spring from SP11 to present)
CHEM 1021 – Chemical Problem Solving I (each Fall from FA10 to present)
CHEM 1031 – Chemical Problem Solving II (each Spring from SP11 to present)
CHEM 2320 – Organic Chemistry I (each Fall from FA11 to present)
CHEM 2340 – Organic Chemistry II (each Spring from SP12 to present)
PHYS 1110/1310 – General/College Physics I (each Fall from FA11 to present)
PHYS 1120/1320 – General/College Physics II (each Spring from SP11 to present)
ES 1060 – Introduction to Engineering Problem Solving (FA14, FA15, & FA16)
UNST 1000 – Orientation to College (FA14 & FA15)

At Illinois Institute of Technology:

Principles of Chemistry I (FA06 & SP07)
Analytical Chemistry (SP07)

As a TA at Syracuse University:

Physical Chemistry Laboratory (FA97 & SP98; as head TA: FA98, SP99, FA00, SP01, FA01, & SP02)
General Chemistry Laboratory (as head TA: SP00, SU01)
Organic Chemistry Lab (SU01)
General Chemistry Recitation (SU00)

RESEARCH EXPERIENCE

Sr. Research Associate, Department of Biological, Chemical and Physical Sciences, Illinois Institute of Technology; Chicago, IL, January 2006 – August 2006.

Using surface enhanced Raman spectroscopy (SERS) we are investigating amino acid binding to SERS active substrates and to develop optimized SERS active substrates for protein binding studies.

Postdoctoral Research Fellow, Department of Chemistry, University of Michigan; Ann Arbor, MI, August 2002 – November 2005.

Using Raman spectroscopy and imaging to study the molecular behavior of bone as a biomaterial, subsurface Raman spectroscopy and fluorosilicate hydrolysis.

SERVICE TO THE PROFESSION

Reviewer for the Journal of Biomedical Optics

SERVICE TO THE COLLEGE

At Central Wyoming College:

Dual/Concurrent Enrollment Assessor for Chemistry & Physics (Fall 2012 – present)
Network Institutional Coordinator/Project Lead, CWC INBRE (Fall 2018 – present)
Project Mentor, CWC Nationwide Eclipse Ballooning Project (Fall 2022 – Spring 2025)
co-PI, Title: Collaborative Research: FEC: Optical Properties of Mineral Dust Aerosols: Building Capacity for Use-Inspired Applications Through Experimental and Theoretical Investigations (Fall 2025 – present)
Student Success Committee (Fall 2018 – Spring 2020)
Curriculum Committee (Fall 2012 – Spring 2017)
Recruitment Committee (Fall 2014 – Spring 2015)
Graduation Matters Subcommittee (Fall 2011 – Spring 2013)
Classroom Wing design, move out and move in (Fall 2010 – Summer 2011)
Health and Science Center design, move out of Classroom Wing, move in (Fall 2012 – Summer 2013)
Instructor/Biological Science Search Committee Member (Summer 2017, Summer 2021, Spring 2022)
Instructor/Business Search Committee Member (Summer 2014)
Instructor/Education Search Committee Member (Summer 2012)
Recruiter Search Committee Member (Fall 2014)

At The University of Michigan:

Undergraduate Research Opportunity Program (UROP) Faculty Advisor (2003-2004)

EXTRACURRICULAR SERVICE

Co-Advisor, Mad Scientists Club (2015 – 2019)
Co-Advisor, Tech Club (2014 – 2015)
Co-Advisor, Undergraduate Research Club (2012 – 2013)

COMMUNITY OUTREACH

Men/Women in Science Local Organizer (2012 – present)
Director, West Central Regional Science Fair (Fall 2016 – present)
Eclipse 2017 Project Team Member (Fall 2016)
Men in Science Workshop Leader (Spring 2015 & Spring 2016)
Eclipse Viewing Session, Central Wyoming College (Fall 2014)
Career Day Speaker, Riverton High School (Spring 2014)
Planets Talk, Lights On Dubois (Spring 2012)
Science Fair Judge, Riverton High School (2011 – 2014)
Chemistry Day Demonstrator, Syracuse ACS Chapter, Syracuse, NY (2000-2001)
Science Olympiad Event Judge, CNY Regional Competition (1999-2001)

OTHER EXPERIENCE

Research Program Coordinator, Department of Physics & Astronomy, Northwestern University; Evanston, IL, September 2007 – August 2010.

Administered and prepared NSF and NASA grants – including budget preparation, proposal submission, and annual progress reports. Coordinated purchasing and expense reimbursement for research group. Administered and maintained group website. Supported group outreach activities by preparing print and multimedia materials for advertisement of outreach events. Assisted in the organization of conferences and preparation of conference proceedings. Assisted in collection and organization of applications for searches for faculty and postdoctoral fellows.

Tutor, Athletic Advising, Syracuse University; Syracuse, NY, 2000-2001.

Individually tutored student-athletes in chemistry, computer science and mathematics.

OTHER ACTIVITIES

Extra Class Amateur Radio License, AF7BW (2013 – present)

LANGUAGES

English (Native)
German (Conversational)
Spanish (Basic)
Latin (Rudimentary)

PROFESSIONAL MEMBERSHIPS

Member of American Chemical Society (1993 – present)
Member of Society for Applied Spectroscopy (2009 – present)
Member of Coblintz Society (2009–present)
Member of Optica/Optical Society of America (2023–present)
Member of Society for Photo-Optical Instrumentation Engineers (2000 – 2006)

PAPERS PRESENTED

The Pittsburgh Conference (Pittcon), Chicago, IL (2004).
Photonics West, Society for Photo-Optical Instrumentation Engineers, San Jose, CA (2004).
Federation of Analytical Chemistry and Spectroscopy Societies (FACSS), Ft. Lauderdale, FL, (2003).
Faraday Discussion 126, Royal Society of Chemistry, Nottingham, UK, (2003).

OTHER MEETINGS ATTENDED

Photonics West, Society for Photo-Optical Instrumentation Engineers, San Jose, CA (2001).
Current Advances in Biotechnology and Nanomedicine, Institute for Lasers, Photonics and Biophotonics, Buffalo, NY (2000).

PUBLICATIONS

1. Noninvasive, in-vivo, near infrared vibrational spectroscopic study of lipid and aqueous phases of skin and near surface tissues.
   Chaiken J, **Finney WF**, Peterson KP, Peterson, CM, Knudson PE, Weinstock RS, Lein P. 2000, *Proc. SPIE*, 3907, 89-97

2. Noninvasive, in vivo, tissue modulated near infrared vibrational spectroscopic study of mobile and static tissues: blood chemistry.
   Chaiken J, **Finney WF**, Peterson CM, Peterson KP, Knusdon PE, Weinstock RS, Lein P. 2000, *Proc. SPIE*, 3918, 135-143

3. Noninvasive in-vivo tissue modulated Raman spectroscopy of human blood: microcirculation and viscosity effects.
   Chaiken J, **Finney WF**, Knudson PE, Peterson KP, Peterson CM, Yang X, Weinstock RS. 2001, *Proc. SPIE*, 4254, 106-118

4. Progress in the noninvasive in vivo tissue modulated Raman spectroscopy of human blood.
   Chaiken J, **Finney WF**, Knudson PE, Peterson KP, Peterson CM, Yang X, Weinstock RS. 2001, *Proc. SPIE*, 4254, 216-227

5. Noninvasive blood analysis by tissue modulated NIR Raman spectroscopy.
   Chaiken J, **Finney WF**, Knudson PE, Peterson KP, Peterson CM, Weinstock RS. 2001, *Proc. SPIE*, 4368, 134-145

6. Noninvasive in vivo tissue modulated quantitative Raman spectroscopy of human blood.
   Finney WF. 2002, Dissertation

7. Bone tissue ultrastructural response to elastic deformation probed by Raman spectroscopy.
   Morris MD, **Finney WF**, Rajachar RM, Kohn DH. 2004, *Faraday Discussions*, 126, 159-168

8. Ultrastructural elastic deformation of cortical bone tissue probed by NIR Raman spectroscopy.
   Finney WF, Morris MD, Wallace J, Kohn DH. 2004, *Proc. SPIE*, 5321, 233-241

9. Recent developments in Raman and infrared spectroscopy and imaging of bone tissue.
   Morris MD, **Finney WF**. 2004, *Spectroscopy–An International Journal*, 18, 155-159

10. Subsurface probing in diffusely scattering media using spatially offset Raman spectroscopy.
    Matousek P, Clark IP, Draper ERC, Morris MD, Goodship AE, Everall N, Towrie M, **Finney WF**, Parker AW. 2005 *Applied Spectroscopy*, 59, 393-400

11. Effect of hemoglobin concentration variation on the accuracy and precision of glucose analysis using tissue modulated, noninvasive, in vivo Raman spectroscopy of human blood: a small clinical study.
    Chaiken J, **Finney WF**, Knudson PE, Weinstock RS, Khan M, Bussjager RJ, Hagrman D, Hagrman P, Zhao Y, Peterson CM, Peterson K. 2005, *Journal of Biomedical Optics*, 10, 031111

12. Dynamic mechanical testing system for Raman microscopy of bone tissue specimens.
    Callender A, **Finney WF**, Morris MD., Sahar ND, Kohn DH, Kozloff KM, Goldstein SA. 2005, *Vibrational Spectroscopy*, 38, 101-105

13. Reexamination of Hexafluorosilicate Hydrolysis by 19F NMR and pH Measurement.
    Wilson E, **Finney, WF**, Callender A, Morris, MD, Beck, LW. 2006, *Environmental Science & Technology*, 40, 2572-2577

14. Classification of Spectroscopically Encoded Resins by Raman Mapping and Infrared Hyperspectral Imaging.
    Fenniri H, Terreau O, Chun S, Oh SJ, **Finney WF**, Morris MD. 2006, *J. Comb. Chem.* 8, 192-198

15. Subsurface Raman spectroscopy and mapping using a globally illuminated non-confocal fiber-optic array probe in the presence of Raman photon migration.
    Schulmerich MV, **Finney WF**, Fredricks RA, Morris MD. 2006, *Applied Spectroscopy*, 60, 109-114

16. Transcutaneous Raman spectroscopy of bone tissue using a non-confocal fiber optic array probe.
    Schulmerich MV, **Finney WF**, Popescu V, Morris MD, Vanasse TM, Goldstein SA. 2006, *Proc. SPIE*, 6093, 164-170

17. Rapid Raman spectroscopy of musculoskeletal tissue using a visible laser and an electron-multiplying CCD (EMCCD) detector.
    Golcuk K, Mandair GS, Callender AF, **Finney WF**, Sahar N, Kohn DH, Morris MD. 2006, *Proc. SPIE*, 6093, 269-275

18. Bone tissue compositional differences in women with and without osteoporotic fracture.
McCreadie BR, Morris MD, Chen TC, Rao DS, **Finney WF**, Widjaja E, Goldstein SA. 2006, *Journal of Biomedical Optics*, 2006, 39, 1190-1195

19. Electrostatic assembly of gold-binding peptides on plasmonic nanostructures.
Tullman JA, **Finney WF**, Lin YJ, Bishnoi SW. 2007, *Plasmonics*, 2, 119-127

20. Insights from and future directions for a nationwide science and engineering education collaboration in stratospheric ballooning.
Beth A. Covitt, Angela C. Des Jardins, Erick P. Agrimson, Jason T. Ash, Sean C.C. Bailey, Katelyn A. Barber, Mike J. Bastidas, Edgar A. Bering, Matthew T. Bernards, Anthony Choi, Nicholas B. Conklin, Jacqueline K.Q. Do, Montana Etten-Bohm, **William F. Finney**, James A. Flaten, Jeffrey M. Freedman, Rachel H. Humphrey, Eric P. Kelsey, Hunmin Kim, Christopher L. LeeWookwon Lee, Jared W. Marquis, Justin R. Minder, Jani M. Pallis, David J. Pawlowski, Chong Qiu, Joanna H. Rivers, Jason A. Ruszkowski, Jillian B. Schmidt, Thomas G. Sharp, Paul E. Slaboch, Suzanne W. Smith, Darci S. Snowden, Alissa R. Sperling. 2026, *Frontiers in Astronomy and Space Sciences*, 12, 1659329.