

CURRICULUM VITAE

**D. KEITH ROPER, Ph.D.**

**Summary:** D. Keith Roper is the Program Leader for the Engineering Research Centers and the Network for Computational Nanotechnology at the National Science Foundation (NSF). He is a Fellow of the American Institute for Medical and Biological Engineering and a member of the Arkansas Academy of Science. He has received one international award and ten citations for Outstanding Professor, Mentor, or Researcher at university, college, and department levels. He holds the Charles W. Oxford Professorship of Emerging Technologies in the Department of Chemical Engineering at the University of Arkansas. From 2010-2013 he served as Assistant Director of Microelectronics-Photonics Graduate Program at the University of Arkansas. From 2011-2012 he was Graduate Coordinator of Chemical Engineering. Previously, he held faculty positions at University of Utah and served as chief scientific officer of Celux Scientific. From 1994-2000 he led campaigns at Merck & Co. to develop clinical vaccines against *S. pneumonia* and *H. influenza* and clinical candidates based on plasmid DNA and adenovirus vectors against *HIV*. He also researched methicillin-resistant *S. aureus* and revascularization growth factors. From 2006-2008, he led preparation of 300 kg phytochlorin e<sub>6</sub> at Frontier Scientific, Inc. for clinical photodynamic cancer therapy. From 1993-2003, he was instrumental in developing adsorptive membranes for virus capture at Pall, Sartorius, and Millipore.

Dr. Roper's research develops novel electrodynamic functionalities in bio-, nano- and meta-materials to advance sensing, biotechnologies, imaging, and energy and water sustainability. Between 2001 and 2013 (when he transitioned to NSF), he was awarded \$9.9M in support for his work. His research received recognition from EPA and DOE and has been featured by *SPIE Newsroom*, *NSF Discoveries*, *R&D Mag*, and over forty other media outlets, including a recent invitation for cover art from *Adv. Opt. Mater.* He has expertise in *simulation* (e.g., computational electrodynamics); *nanofabrication* via top-down (e.g., EBL, CVD, evaporation, FIB, plasma etch, sputtering) and bottom-up directed self-assembly of bio/polymer and metamaterials; and *characterization* of assembled nanoarchitectures using microscopies (SEM, TEM, AFM, LSCM, MRI, optical) and spectroscopies (EELS, ICP, SERS, SPR, TUV). By engineering interactions between subatomic particles he aims to modulate biologics information, creating new ways to combat disease and induce cell and tissue responses. He developed novel methods for cell manufacture, viral detection and propagation, bioprocessing, and biomolecular interaction analysis. His lab recently characterized plasmon dephasing via hot carriers in van der Waals materials using electron energy loss spectroscopy (*JAP* **116** 054313 (2014)). He has authored or coauthored two textbooks, 71 peer-reviewed technical articles and published proceedings, two book chapters, three U.S. patents, one E.P. patent, six U.S. patent applications, and three online tools. His publications have an h-index of 19 and an i10-index of 33. He has given 65 invited lectures and 112 conference presentations. He is active in ACS, AIChE, CMOS ET, and IEEE. His Ph.D. is in chemical engineering from the University of Wisconsin. See <http://nbphotonics.uark.edu/> for more details.

As NSF Program Leader, Dr. Roper leads solicitation (e.g., NSF 15 589), implementation, and assessment of research integrated with graduate education and industry innovation in 22 centers that involve 4,770 faculty, 100+ leading universities, federal labs, state agencies, institutes, and 385 industrial partners. He is responsible for goal and policy development, strategic planning, resource allocation, and assessment for multi-institutional, interdisciplinary programs with a total annual budget of \$75 million. He has been appointed to working groups for several NSF-wide programs: Graduate Education Strategic Plan 2015-2020, NSF Research Traineeships (NRT), Graduate Research Fellowship Program (GRFP), and BRAIN. This led to co/authorship and administration of solicitations for Accelerating Integrative Research in Neuroscience and Cognitive Science (AIR-NCS), Gen-3 ERCs, GRFP, NRT, Scalable Nanomanufacturing, and Veterans Supplements representing over \$134 million in new awards annually. He coordinates research interactions in centers, programs, and inter/national initiatives involving federal agencies (i.e., DHS, DOE, EPA, FDA, NIH, NIST, and DoD), state economic development offices, trade associations (e.g., BIO, PhRMA, SRC), industry, private equity, foundations, and scientific institutes. He interacts with the Graduate Research Council, National Network for Manufacturing Innovation, White House Office of Science and Technology Policy, congressional offices, and institutes (e.g., Brookings Institution). He has interacted with science agencies in Canada, China, Germany, India, Ireland, Japan, Qatar, Saudi Arabia, Switzerland, and the United Kingdom.

## PROFESSIONAL POSITIONS

- 2014 - *Program Leader*, Division of Engineering Education and Centers, National Science Foundation (NSF). Oversee 19 Engineering Research Centers (ERCs) and 3 Networks for Computational Nanotechnology (NCNs) involving 100+ universities, 22 NSF program officers and 3 staff. Annual budget of \$75 million. Lead administration of \$18 million in new awards.
- 2012 - 2014 *Program Director*, Division of Engineering Education and Centers, NSF. Managed 3 ERCs, 2 Nanotechnology Science and Engineering Centers (NSECs), and 1 NCN. Annual budget of \$21 million. Participated in coordinating review and administration of \$134 million in new awards.
- 2008 - *Associate Professor*, Department of Chemical Engineering, University of Arkansas (UA). Asst. Director of  $\mu$ EP Graduate Program and Charles Oxford Chair of Emerging Technologies. Lead bio-inspired electrostatics research. Awarded \$7.1 million. Currently advise 5 grad students.
- 2001 - 2008 *Assistant Professor*, Department of Chemical Engineering, University of Utah (UU). Adjunct in Dept. of Bioengineering and Dept. of Materials Science and Engineering. Prepared \$6 million of anti-cancer drug involving 7 students. Member of 8 committees. Mentored 55 undergraduates.
- 1997 - 2001 *Research Fellow*, Bioprocess Research and Development, Merck & Co. Led teams of up to 18 scientists developing vaccines against *S. pneumonia* and *H. influenza*; clinical candidates with plasmid DNA and adenovirus vectors against *HIV*; and studying methicillin-resistant *S. aureus*.
- 1994 - 1997 *Engineering Associate*, Bioprocess Research and Development, Merck & Co. Led \$4.9 million demonstration of new clinical *H. influenza* candidate. Prepared Phase I clinical compounds.

## EDUCATION AND TRAINING

- 1994 *Ph.D. Chemical Engineering*, University of Wisconsin-Madison, Madison, WI. Characterizing Mass Transport in Stacked-Membrane Chromatography using MR flow imaging. E.N. Lightfoot, Advisor.
- 1989 *B.S. Chemical Engineering*, Brigham Young University, Provo, UT. *Magna Cum Laude*. Minor in Chemistry. Researched  $\text{Na}^+/\text{K}^+$  separation by crown ethers in hollow-fiber membranes.
- 1989 *Intern Research Engineer*, Wiltec Research Corp., Provo, UT. Designed and implemented high-pressure systems to measure thermodynamic parameters.
- 1988 *Intern Contact Engineer*, Exxon Chemical Americas, Baton Rouge, LA. Simulated resin polymerization kinetics and reaction dynamics using Statistical Analysis Software (SAS).

## ADMINISTRATIVE EXPERIENCE

**National Science Foundation (NSF)** was created by Congress in 1950 “to promote the progress of science; to advance the national health prosperity and welfare; to the secure the national defense...” NSF funds 24% of federally-supported, academic research with an annual budget of \$7.5 billion and a workforce of 2,100.

2014 - *National Science Foundation Program Leader*  
Lead integration of research, education, and innovation in 19 multi-institutional, interdisciplinary ERCs and 3 NCNs involving 100+ universities. Manage \$75 million annual budget and lead administration of \$18 million in new awards. Coordinate 22 NSF program officers and 3 staff. ERCs involve 4,770 faculty and students and 836 participating state agencies, institutes, federal labs, and industries. Conducted 30 site visits involving over 200 Ph.D.-level academic, industry, and federal reviewers to evaluate progress relative to program objectives.

### ➤ Enhanced Center Impacts by Engaging External Partners

- Co-launched the first international center-to-center trilateral research collaborations between the U.S., Republic of Ireland, and Northern Ireland. Initial investments totaled over \$4 million. Coordinated objectives, policies, and processes with Science Foundation Ireland (SFI) and Department for Employment and Learning (DEL NI). Implemented follow-on evaluation and broadened investment.

- Co-sponsored and co-organized an international workshop with Deutsche Forschungsgemeinschaft (DFG) in 2014 to create a neurotechnology roadmap, published in *IEEE Trans Biomed Eng* 2016 63(7):1354-67.
  - Coordinated a 'Bridging Workforce Development' workshop in 2016 to examine best practices in the U.S., Canada, and Germany to sustain integration of research and graduate education in emerging areas.
  - Co-organized a meeting between ERC Directors from Centers, industrial advisory board members, and members of the House Subcommittee on Science, Space & Technology to share program advances.
  - Conducted annual meetings with university administrators (i.e., president/chancellor, vice provost/president for research, college dean, associate dean, department head) to promote faculty involvement, facility use, continuation of support, indirect cost return, and technology transfer in centers.
  - Engaged ERC Directors to pursue university interactions as lead or participant in four institutes of the National Network for Manufacturing Innovation (NNMI). These are five-year programs of over \$100 million. Two more ERCs have planning grants to develop NNMI institutes.
- Increased Center Support through Refined Center Operations
    - Authored ERC solicitation NSF 15-589 which refined and integrated strategic plans for research, education, innovation, and diversity; called for evidence-based approaches to educational practices; and implemented an advisory board on workforce development (education and professional skills).
    - Championed a \$10 million overall increase in annual support for ERCs – the first increase in 13 years.
- Advanced Center Progress through Mentored Support of Faculty
    - Mentored six seasoned faculty who became Center Directors involving more than 19 leading U.S. universities in facets of center management including selecting projects, strategic planning, setting SMART goals, articulating research and education, joint partnerships, and creating a culture of inclusion.
    - Supported eight centers in achieving a critical 3<sup>rd</sup> or 6<sup>th</sup> year renewal by mentoring directors and faculty to overcome deficiencies in administrative processes, misalignment between research, education and innovation, inadequate advisory board participation, and/or departure of key leadership or expertise.
- Enhanced Center Infrastructure to Advance Research, Education and Inclusion
    - Initiated a \$0.6 million program to use data analytics to identify research synergies among faculty participating in cross-cutting thrusts and synergize activity toward breakthroughs at emergent interfaces.
    - Launched a \$0.5 million program to expand participation of individuals with disabilities in center research nationwide
    - Initiated regular teleconferences with directors and graduate student leaders from each ERC to build community, provide program updates, sharing experiences and best practices, and preparing for events.
- Promoted Integration of Graduate Education, Research and Diversity beyond ERC and NCN
    - Coordinated evaluation and administration of awards for \$23 million in new, multi-institutional NSF Research Traineeship awards (NRT) to support integration of graduate education, professional development, and basic research in genomics, environmental engineering, and sustainable energy.
    - Conducted international workshop sessions on integrating graduate education and research at King Abdullah University of Science and Technology (KAUST) in 2014.
    - Appointed to a working group (7 NSF appointees) to develop NSF Graduate Education Strategic Plan.
    - Organized 'Building Tomorrow's Leaders' sessions in 2014 to expand diversity in graduate education.
- Accelerated Outreach to Integrate Research, Education, and Innovation Nationally and Internationally
    - Interacted with Graduate Research Council (GRC), National Academies of Sciences, Engineering and Medicine, American Society for Engineering Education (ASEE), White House Office of Science and Technology Policy (OSTP), Wilson Center, and federal agencies (i.e., DOE, FDA, HHS, NIH) to promote integration of graduate education and research in emerging areas in large scale federal awards.
    - Co-compiled, edited and proofread 'NSF ERCs: Creating New Knowledge, Innovators, and Technologies for Over 30 Years' which was published and distributed broadly to highlight 30 years' progress in ERCs.
    - Liaised with science authorities, federal agencies, and academic institutions in Canada, China, Georgia, Germany, India, Ireland, Japan, Qatar, Saudi Arabia, Switzerland, and the United Kingdom to share best practices on integrating graduate education and research in large scale center activities.

2012 - 2014 *National Science Foundation Program Director*

Responsible for oversight of research, education, and innovation in 3 multi-institutional, interdisciplinary ERCs, 1 NCN, and 2 Nanotechnology Science and Engineering Centers (NSECs). Managed a \$21 million annual budget and participated in administration of \$134 million in new awards. Conducted proposal evaluation in over 20 panel reviews and co-organized panel reviews of over 4,000 fellowship applications and grant proposals.

- Advanced Frontiers of Neuroscience, Materials Science, Photonics, and Engineering Biology
  - Represented ENG in intra- and inter-agency Working Groups for Accelerating Integrative Research in Neuroscience and Cognitive Science (AIR-NCS), Emerging Frontiers in Research and Innovation (EFRI), Optics and Photonics, Ebola Virus, and Synthetic Biology.
  - Prepared public statements regarding policy, practices of regulatory safeguards and ethical considerations in synthetic biology, e.g., *CQ Researcher* Apr. 25, 2014, 24(16) 361-384.
  - Coauthor and/or ENG/EEC contact on solicitations and Dear Colleague Letters for AIR-NCS, EFRI, Gen-3 ERCs (NSF 13-560), and Veterans Research Supplements (VRS).
- Cultivated Excellence in Integrating Graduate Education, Research, and Innovation
  - Guided increases in annual associated funding (38%), mentoring (310%), publications (270%), patent applications (160%), graduate diplomas (31%), and underrepresented participants (45%) in ERCs I managed.
  - Participated on Graduate Research Fellowship Program (GRFP) working group for 3 years, organizing proposal reviews and coordinated allocation and awards of \$66 million annually.
  - Conducted more than 20 panel reviews and co-organized panel reviews of over 4,000 GRFP applications and grant proposals, participating in administration of over \$134 million in new awards.
- Initiated Cross-Cutting Research and Education Intersecting Biology, Cybertechnology, and Nanoelectronics
  - Initiated a \$0.6 million program to develop cyberinfrastructure to curate and share yeast genomic and metabolomics data and course modules across multiple classrooms and institutions.
  - Launched a \$0.5 million program to accelerate development of wireless, personal health monitors for warfighters using nanotechnology, low-powered nanoelectronics, and physiological power harvesting.
  - Initiated research effort in cybersecurity for wireless neurotechnologies in 2012.
- Engaged External Stakeholders and International Agencies to Advance Center Initiatives
  - Engaged faculty, department chairs, and deans at over 25 leading universities to advance objectives of ERC, NSEC, and NCN programs.
  - Participated in doubling the number of stakeholder agencies, industries, and foundations that supported associated projects in ERCs I managed to fifteen per center.
  - Liaised with Program Officers and Researchers in Canada, European Union, Germany, India, Japan, Saudi Arabia regarding research, graduate education, and innovation in ERCs and explored collaborations.

**University of Arkansas (UA)** was founded in 1871. UA spends \$134 million annually in research and is classified Highest Research Activity (Carnegie). It enrolls 26,754 students. UA is rated #5 best college value under \$30K/yr (Kiplinger), #69 public university (USNWP), and #7 fast-growing public university (Chronicle). UA Engineering spends >\$20 million annually in research and has the #4 best online graduate program.

2010 - 2013 *Assistant Director, Microelectronics-Photonics Graduate Program*

The Microelectronics-Photonics Graduate Program ( $\mu$ EP) is an interdisciplinary, degree-granting, research and educational program at UA involving 64 faculty members and 65 M.S. and Ph.D. candidates from Colleges of Engineering, Arts and Sciences, and Business. I oversaw recruitment, admissions, enrollment, and retention of graduate students. Responsible for development, administration, and assessment of the graduate candidacy examinations. Implemented professional skills development and mentoring. Co-hosted  $\mu$ EP alumni events.

- Expanded  $\mu$ EP Recruitment through Undergraduate Education, Research, and Outreach
  - Co-led establishment of a new Nanotechnology Minor program that received \$200K from NSF/DUE and \$25K annually from UA. Integrated relevant *curriculum* departments in three colleges, eliciting approval from department heads of the respective academic units.

- Collaborated in successful renewal of the  $\mu$ EP NSF Research Experiences for Undergraduates (REU).
  - Established new electron optics capabilities in engineering: SEM, CVD, EBL, NIL, Raman, and SPR.
  - Interacted with minority serving institutions and 4-year colleges in Arkansas to expand participation of underrepresented minorities and domestic students.
  - Led international recruitment to Ambedkar National Institute of Technology, Jalandhar, India, Instituto Politécnico Nacional, Mexico City, Mexico, and Universidad de Baja California, Tijuana, Mexico.
- Advanced  $\mu$ EP Enrollment and Graduate Student Mentoring
- Instrumental in achieving record graduate enrollments in  $\mu$ EP in 2012 through above efforts.
  - Implemented a longitudinal mentoring program that involved (i) forming long-term, strategic partnerships with K-12/undergraduate institutions; (ii) programmatic introduction of graduate candidates to campus before the 1<sup>st</sup> semester; (iii) establishing student cohorts with training in professional skills development; (iv) creating horizontal and vertical mentoring networks for graduate students with peers and with faculty beyond the advisor; and (v) developing personalized education paths with annual progress evaluation.
  - Conducted annual advising of all graduate candidates after their first year in the  $\mu$ EP program.

2011 - 2012 *Graduate Coordinator, Chemical Engineering Department*

The Ralph E. Martin Chemical Engineering Department (CHEG) at UA includes 15 faculty members, 285 undergraduates, and 35 M.S. and Ph.D. candidates. I oversaw recruitment, admissions, enrollment, placement, and retention of graduate students. Organized department administration of first-year graduate stipends and university fellowships to entering graduate students and supplementary funding to ongoing graduate students.

- Expanded CHEG Graduate Student Recruitment through Undergraduate Research and Outreach
- Co-authored a successful proposal for an REU Site in Applied Biotechnology in Life Sciences (\$289K) to attract undergraduate interest in the CHEG graduate program. Co-administered the site.
  - Visited minority serving institutions in Arkansas to expand participation of underrepresented minorities.
- Advanced CHEG Enrollment, Graduate Student Mentoring, and Graduation Rates
- Led expansion of enrollment by 7% in AY2012-2013 through above efforts.
  - Initiated and implemented a longitudinal mentoring program for recruitment, retention, and graduation that (i) developed strategic partnerships with K-12 and domestic and international undergraduate institutions; (ii) created horizontal and vertical mentoring for graduate students with peers and with faculty beyond the advisor; and (iii) developed personal education paths with annual progress evaluation.
  - Conducted annual advising of graduate candidates after their first year in CHEG.
  - Instrumental in more than doubling M.S. and Ph.D. graduation rates in AY2012-2013.
- Improved Quality of CHEG Graduate Education Integrated with Research
- Led university-wide graduate student workshop sessions on preparing and writing manuscripts for submission to archival journals and graduate theses.
  - Coordinated faculty selection of graduate curricula, and calendaring curricular offerings.
  - Coordinated supporting documentation for graduate candidacy examination, thesis committee selection, and thesis defense with the Graduate School.
  - Coordinated graduate student participation in annual safety training, university-wide research poster sessions, and professional skills development workshops.
  - Interacted with faculty, the department head, the university's Health Center, Environmental Health and Safety, and the Graduate School to resolve issues and concerns of or about graduate students.

**University of Utah (UU)** is an urban public research university founded in 1850. UU spends \$411 million in research annually and is classified Highest Research Activity (Carnegie). It is ranked 47<sup>th</sup> nationally (ARWU). UU enrolls 31,673 students (7,764 graduate students). The College of Engineering spends \$80 million annually in research (ranking 37<sup>th</sup> nationally in total annual research expenditures) and awards 876 degrees annually.

2003 - 2008 *Chemical Engineering Department Safety Committee Chair*

The Chemical Engineering Department (ChE) at UU includes 26 faculty members. I was responsible for laboratory inspections, safety training, and managing department and college response to safety incidents.

- Advanced Biological Safety
  - Reviewed all protocols sent to Institutional Biosafety Committee for recombinant DNA.
  - Initiated and conducted certifiable training for UU personnel in aseptic technique and pathogen handling.
- Effectively Mitigated and Managed Safety Incidents.
  - Initiated HAZOP studies, Chemical Hygiene Plans, annual laboratory inspections, and root case analyses.
  - Led department response to accidental H<sub>2</sub> explosion and hazardous dust accumulation.

2006 - 2008 *Frontier Scientific Inc. Project Administrator*

Frontier Scientific, Inc. (FSI) is a Utah-based fine chemicals company that develops porphyrin anti-cancer compounds using combinatorial and cross coupling chemistries. I was responsible for process design, facilities build-out, equipment installation and operation qualification (IQ/OQ), to recover and purify chlorin e<sub>6</sub> for clinical assessment in photodynamic cancer therapy. Led \$6 million campaign to prepare 300 kg chlorin e<sub>6</sub>.

- Integrated Graduate Education and Research in Clinical Pharmaceutical Development
  - Mentored 3 graduate and 4 undergraduate students in research, development and operation of processes.
  - Ensured compliance with and provided training in state and federal (e.g., EPA, FDA, OSHA) regulations.
  - Advised one M.S. student who characterized morphology and composition of chlorin e<sub>6</sub>.
  - Delivered chlorin e<sub>6</sub> on time, within specifications, and under budget, for a high return on investment.

**Merck & Co. (Merck)** is a research-intensive Fortune 100 biopharmaceutical company with 68,000 employees and \$44 billion annual revenue. It was founded in 1891 to find new ways to treat and prevent illness. Merck researchers discovered vitamin B1, launched the first statins to treat high cholesterol, and developed the first measles vaccine. Recent advances include approaches for hepatitis C, HIV, diabetes, and immuno-oncology.

1997 - 2000 *Merck Research Fellow*

Responsible to develop FDA-approvable procedures and operations, build out facilities, install and qualify equipment, and operate processes to ferment or culture, recover, and purify biologicals (i.e., plasmid DNA, viral vector, polysaccharide, protein/lipid micelles) for clinical assessment. Led teams of up to 18 B.S. to Ph.D. level engineers and scientists that developed and manufactured four major vaccine products. Coordinated with researchers, administrators, analytical, formulation, manufacturing, facilities, compliance, and unions.

- Developed First Recombinant Viral-Vectored Clinical Vaccine Candidate against HIV
  - Participated in 1<sup>st</sup> exploration of humoral and cellular immunogenicity *in vivo* resulting from mammalian transcription of recombinant plasmid DNA and adenoviral vectored gag/pol/nef gene templates.
  - Developed novel current Good Manufacturing Practice (cGMP) processes for cell culture, recovery, purification, and analysis of plasmid DNA and adenoviral-vectored clinical antigens.
  - Prepared plasmid DNA and infectious non-replicating adenoviral *HIV* gene vectors for Phase I trials.
- Advanced Prevention of Infectious Disease Worldwide
  - Led four major (\$1 to 4 million) campaigns to develop and manufacture clinical vaccine candidates. Made clinical vaccines against *S. pneumonia* and *H. influenza*; and clinical candidates based on plasmid DNA and adenovirus vectors against *HIV*. Researched methicillin-resistant *S. aureus* (U.S. Patent 7,157,443).
  - Developed novel cGMP processes for cell culture, fermentation, recovery, purification, and analysis of protein and antigenic polysaccharide and membrane vesicles and adenoviral gene delivery vectors.
  - Authored or co-authored 14 cGMP documents, Technical Pharmaceutical Reports, and cGMP Lab Procedures; one U.S. and one E.P. patent; and 3 related peer-reviewed articles with over 80 citations;
  - Increased market availability of vaccines contributing to decreased mortality rates estimated in the millions worldwide.
- Mentored and Trained Pharmaceutical Researchers
  - Co-advised a M.S. student at UMBC on vaccine development. Co-authored 2 peer-reviewed publications.
  - Directed selection, and placement of 22 summer interns in the division's university recruitment program.
  - Oversaw management and training of scientific personnel (e.g., produced two training videos). Directed activities of union laborers and outside contractors.
  - Ensured compliance with and provided training in state and federal (e.g., EPA, FDA, OSHA) regulations.

## AWARDS AND HONORS

### NATIONAL/FEDERAL AGENCY

2015 National Science Foundation Certificate of Appreciation  
2014 Fellow, American Institute for Medical and Biological Engineering (AIMBE)  
2011 American Chemical Society Publications Certificate of Appreciation  
2005 Environmental Protection Agency P3 Award: Honorable Mention

### INTERNATIONAL

2015 Brookings Institute Workshop Participant, Continuous Manufacturing Washington D.C.  
2012 Chemcon – NEERI Distinguished Speaker Award 2012, Kolkata, India  
2012 Distinguished Participant, Instituto Politecnico Nacional, Mexico, SIMPOQUIMIA ESIIQIE

### STATE

2013 Member, Arkansas Academy of Science

### UNIVERSITY/COLLEGE

2015 University of Arkansas Outstanding Mentor, May 2015 (1 citation)  
2013 University of Arkansas Outstanding Mentor, May 2013 (1 citation)  
2011-2012 College of Engineering Outstanding Researcher (1 of 7 college-wide), May 2012  
2012 University of Arkansas Outstanding Mentor, May 2012 (2 citations)  
2011 University of Arkansas Outstanding Mentor, May 2011  
2011 College of Engineering Faculty Gold Medalist (1 of 6 university-wide), May 2011  
2010-2011 College of Engineering Outstanding Researcher (1 of 7 college-wide), May 2011

### DEPARTMENT/CENTER

2011 University of Arkansas Department of Chemical Engineering Outstanding Researcher, Apr 2011  
2006-2007 Outstanding Professor, University of Utah Department of Chemical Engineering  
2005 University of Utah Bennion Center: Nominee, Service Learning Professor of the Year  
2005 University of Utah Bennion Center: Nominee, Service Learning Class of the Year

### INSTITUTIONAL

2005 Academy for Math, Engineering & Science: Certificate of Appreciation, May 26, 2005  
1998 Merck Award for Excellence: *Pneumovax®23*, Merck Research Laboratories  
1998 Merck Award for Excellence: *Safety*, Merck Research Laboratories  
1996 Merck Award for Excellence: *iOMPC96 Demonstration*, Merck Research Laboratories

### PUBLICATIONS/PRESENTATIONS

2016 Invited to submit cover art to *Adv. Opt. Mater.*  
2013 Department of Energy Innovation in Fuel Cycle Research Award, 2<sup>nd</sup> place, *APL* publication  
2012 3<sup>rd</sup> Place. Microelectronics/Photonics Industrial Advisory Council Presentation, Nov 2012  
2012 1<sup>st</sup> Place. University of Arkansas Graduate Education Week Poster Session, Feb 2012  
2009 1<sup>st</sup> Place. Nanoscale Science & Engineering Forum. AIChE Annual Meeting, Nov 2009  
2009 3<sup>rd</sup> Place. Materials Research Society Poster Session. Univ of Arkansas Chapter, Nov 2009

## FELLOWSHIPS AND SCHOLARSHIPS

### FEDERAL

National Institutes of Health Biotechnology Training Program Trainee, 1990-93  
National Science Foundation Honorable Mention, 1989, 1990

### UNIVERSITY

Wisconsin Alumni Research Foundation Fellow, 1989-90  
Karl G. Maeser Scholarship, 1988-89  
Brigham Young University Trustees Scholarship, 1986-89



**LEADERSHIP**

## INTERNATIONAL LEADERSHIP

- 2016 “Building Tomorrow’s Leaders: Bridging workforce development in engineering research centers to meet demand for a skilled workforce.” Arlington, VA. Feb 25-26, 2016, Program Directors: Jackson, D. and **Roper, D.K.**
- 2015 Trilateral Center-to-Center Research Collaboration within the U.S. – Ireland Partnership Program involving multi-institutional, interdisciplinary research centers supported by NSF, Science Foundation Ireland (SFI) and Department of Education and Learning (DEL NI), Northern Ireland. Program Directors: Gavin, A.M. (DEL NI), McEvoy, A. (SFI), and **Roper, D.K.** (NSF)
- 2014 “New Perspectives on Neuroengineering and Neurotechnologies” Nov. 12-14, 2014. Arlington, VA. Workshop Sponsors: **Roper, D.K.** (NSF); Vogler, M. (DFG). Moritz et al., *IEEE Trans Biomed Eng* 2016 63(7):1354-67. New Perspectives on Neuroengineering and Neurotechnologies: NSF-DFG Workshop Report.
- 2013 National Institute of Information and Communications Technology (NICT) 9<sup>th</sup> Annual Forum: Brain Computer Interfaces. Jan. 29, 2013. Washington D.C. Panelist: **Roper, D.K.**
- 2012 ERASynbio European Union-United States Meeting, Washington, DC, Nov 8-9, 2012. Participant: **Roper, D.K.**

## FEDERAL LEADERSHIP

*National Science Foundation Solicitations Co/Authoried*

- 2016 NSF 16-513. *Scalable Nanomanufacturing* (SNM). Cooper, K.; Kramer, B.; Savage, N.; Zaghloul, M.; Madsen, L.; **Roper, K.**; Mehta, R.
- 2015 NSF 15-589. *Gen-3 Engineering Research Centers* (ERC). **Roper, D.K.**; Jackson, D.; Londono, C. NSF 15-502 *Two-Dimensional Atomic-layer Research and Engineering* (2-DARE). Pavlidis, D; Rastegar, S.; Fordyce, G.; Kramer, B.; Ying, C.; Wesson, R.; **Roper, K.**; Patten, T., Mehta, R.; Olbricht, B.
- 2014 NSF 14-611 *Integrative Strategies for Understanding Neural and Cognitive Systems* (NSF-NCS). Cleary, A.; Heit, A.; Kalyanasundaram, B.; Leen, T.; Namy, L.; **Roper, K.**; Sambanis, T.; Tuller, B.; Walton, A.; Whang, K.
- NSF 14-548. NSF Research Traineeship Program (NRT). Boone, R.; Tankersley, R.; **Roper, K.**; et al.
- 2013 NSF 13-583. EFRI 2014. *Two-Dimensional Atomic-layer Research and Engineering* (2-DARE). Rastegar, S.; Fordyce, G.; Wesson, R.; Kaul, A.; Acharya, S.; Kramer, B.; Schrag, B.; **Roper, K.**; Ying, C.; Tolbert, L.
- NSF 13-560. *Gen-3 Engineering Research Centers* (ERC). Preston, L.; Jackson, D.; Read, C.; **Roper, K.**

*Congressional Briefings Supported*

- 2015 Capitol Hill Event: Thirty Years of NSF Engineering Research Centers, Oct 28, 2015. Cannon Caucus Room. (Co-organizer, **Roper, D.K.**)
- U.S. Congressional Briefing: Future of Bioproducts: Emerging Opportunities in Advanced Biomanufacturing, Feb 25, 2015. Capitol Visitor Center (SVC) 209-08.
- 2014 U.S. Congressional Briefing: Sustaining U.S. Leadership in Biotech, Jun 26, 2014. B-339 Rayburn House Office Building. with U.S. Rep. E. Swalwell.

*Federal Interagency and Agency Workshops Participant*

- 2016 HHS Interdepartmental/Interagency Continuous Manufacturing Meeting, Jul 15, 2016. Washington D.C. Invited Participant: **Roper, D.K.**

- 2015 National Nanotechnology Initiative (NNI) Progress in Nanotechnology, Dec. 9-10, 2015. Arlington, VA. Session Chair: **Roper, D.K.**  
NSF-NIH Workshop for Integrative Additive Biomanufacturing and Tumor Engineering. Bethesda, MD. Apr 1-2, 2015. Speaker: **Roper, D.K.**
- 2014 National Nanotechnology Initiative (NNI) Progress in Nanotechnology, Dec. 9-10, 2014. Arlington, VA. Session Chair: **Roper, D.K.**  
NSF Engineering Research Centers Biennial Meeting. Oct. 27-28, 2014. Arlington, VA. Co-organizer: **Roper, D.K.**
- 2012 National Nanotechnology Initiative (NNI) Progress in Nanotechnology, Dec. 3-4, 2012. Arlington, VA. Participant: **Roper, D.K.**  
NSF Engineering Research Centers Biennial Meeting. Nov. 14-16, 2013. Arlington, VA. Co-organizer: **Roper, D.K.**

*National Science Foundation Program Management*

- 2016 Engineering Education and Centers Division Committee of Visitors. Jul 19-20, 2016, Arlington VA.  
U.C. Berkeley Synberc Reverse Site Visit Meeting. Jun. 21, 2016, Arlington, VA.  
U.N.C. Greensboro RMB 8<sup>th</sup> Annual Site Visit Meeting. Jun. 6-8, 2016, Greensboro, NC.  
Purdue University NCN-NEEDS 4<sup>th</sup> Annual Site Visit Meeting. May 17-19, 2016, Palo Alto, CA.  
University of Arizona CIAN 8<sup>th</sup> Annual Site Visit Meeting. May 4-6, 2016, New York, NY.  
Purdue University NCN Cyber Platform 4<sup>th</sup> Annual Site Visit Meeting. Apr. 26-28, 2016. West Lafayette, IN.  
University of Illinois Urbana Champaign (UIUC) NCN nanoBIO 4<sup>th</sup> Annual Site Visit Meeting. Apr. 20-22, 2016. Champaign, IL.  
University of Washington CSNE 5<sup>th</sup> Annual Site Visit Meeting. Apr. 11-13, 2016. Seattle, WA.  
Princeton University MIRTHER Reverse Site Visit Meeting. Apr. 3-5, 2016. Arlington, VA.  
University of Minnesota CCEFP Reverse Site Visit Meeting. Jan 28, 2016. Arlington, VA  
Stanford University ReNUWI 5<sup>th</sup> Annual Site Visit Meeting. Jan. 11-13, 2016, Palo Alto, CA.
- 2015 Rice University NEWT Kick Off Meeting. Oct. 21-22, 2015. Houston, TX.  
Arizona State University CBBG Kick-Off Meeting. Sept 16-17, 2015. Phoenix, AZ.  
N.C. State FREEDM 7<sup>th</sup> Annual Site Visit Meeting. May 26-29, 2015. Raleigh, NC.  
N.C. State ASSIST 3<sup>rd</sup> Annual Site Visit Meeting. May 18-21, 2015. Raleigh, NC.  
Iowa State University CBIRC 7<sup>th</sup> Annual Site Visit Meeting. May 11-14, 2015. Ames, IA.  
University of Washington CSNE ERC 4<sup>th</sup> Annual Site Visit, Seattle, WA, May 4-7, 2015  
UIUC NCN nanoBio 3<sup>rd</sup> Annual Site Visit, Champaign IL, Apr. 28-30, 2015  
U.T. Austin NASCENT 3<sup>rd</sup> Annual Site Visit Meeting. Apr 20-23, 2015. Austin, TX.  
Rutgers University CSOPS 9<sup>th</sup> Annual Site Visit Meeting. Apr. 13-15, 2015. Rutgers, NJ.  
Purdue University NCN Cyber Platform 3<sup>rd</sup> Annual Site Visit Meeting. Apr. 8-10, 2016. West Lafayette, IN.  
Purdue University NCN-NEEDS 4<sup>th</sup> Annual Site Visit Meeting. May 17-19, 2016, Palo Alto, CA.
- 2014 Rutgers University Center for Structured Organic Particulate Systems IAB Meeting, Oct, 2014  
N.C. State ASSIST ERC 2<sup>nd</sup> Annual Site Visit. Charlottesville, VA, May 19-20, 2014  
University of Washington CSNE ERC 3<sup>rd</sup> Annual Site Visit, Seattle, WA, May 5-8, 2014  
Iowa State University CBIRC ERC 6<sup>th</sup> Annual Renewal Site Visit, Ames, IA, May 12-15, 2014  
UIUC NCN nanoBio 2<sup>nd</sup> Annual Site Visit, Champaign IL, Apr. 15-17, 2014  
U.C. Berkeley Synberc NSF ERC 8<sup>th</sup> Annual Site Visit. Berkeley, CA, Mar 25-7, 2014

- 2013 Neuroscience 2013, NSF Exhibitor, San Diego, CA, Nov. 9-13, 2013  
 UIUC NanoBioNode Strategic Planning Meeting, Champaign IL, Sept 23, 2013  
 Iowa St. Univ. CBIRC Strategic Planning Meeting, Ames, IA, Sept 10, 2013  
 N.C. State ASSIST ERC 1st Annual Site Visit. Raleigh, NC, May 2013  
 U.C. Berkeley Synberc ERC 7<sup>th</sup> Annual Site Visit. Washington DC, Mar 26-7, 2013  
 Introduction of Empire Robotics Inc. (W. Culley) to NSF ERC CSNE (R. Roberts, R. Rao, H. Chizeck) for interaction as an Industrial Affiliate. Feb 13, 2013.  
 Introduction of Maxtec LLC (B. Brierly) to NSF ERC ASSIST (J. Muth; V. Misra) for interaction as an Industrial Advisory Board Member. Jan 16, 2013.
- 2012 Ohio State Univ. CANPBD Program Meeting, Columbus, OH, Nov 2, 2012  
 University of Washington CSNE Industrial Advisory Board Mtg. Seattle WA, Sept 20-21, 2012  
 U.C. Berkeley Synberc SynBio Leadership Accelerator, Warrenton, VA, Oct 1-4, 2012  
 N.C. State ASSIST ERC Kick-off. Raleigh, NC, Sept 5-6, 2012

## NATIONAL INSTITUTIONAL LEADERSHIP

### *National Institutional Workshop Participation*

- 2016 American Society of Engineering Education (ASEE) Engineering Research Council Annual Conference. Bethesda, MD, Mar. 7-9, (2016). Panelist: **Roper, D.K.**  
 Council of Graduate Schools (CGS) “Evaluating International Research Experiences for Graduate Students”. Feb. 16, 2016. Arlington, VA. Participant: **Roper, D.K.**
- 2015 Brookings Institute Workshop on Continuous Pharmaceutical Manufacturing. Oct. 19, 2015. Washington D.C. Panelist: **Roper, D.K.**
- 2013 University Industry Demonstration Partnership, Washington DC, Nov. 2013. Participant: **Roper, D.K.**
- 2012 Woodrow Wilson International Center for Scholars: Synthetically designed algae for biofuel. Washington, DC, Dec 14, 2012. Panelist: **Roper, D.K.**  
 IEEE Life Sciences Grand Challenges Conference, Washington, DC, Oct 4-5, 2012. Participant: **Roper, D.K.**  
 Woodrow Wilson International Center for Scholars: Risk in Synthetic Biology. Washington, DC, Jun. 29, 2012. Panelist: **Roper, D.K.**

## UNIVERSITY COMMITTEES

### *University of Arkansas*

State level: Arkansas Dept of Education Engineering and Science Partnership, Instructor  
 University level: Graduate School Advisory Board; Analytical Facility User Committee  
 College level: Safety Committee (co-chair); Strategic Planning Committee  
 Department level: Graduate Studies Committee (chair)

### *University of Utah*

State level: Utah Campus Compact Invited Lecturer and contributor to 2006 State of Engagement Report; Governor’s Office of Economic Development Invited Speaker and participant, 2006  
 University level: Undergraduate Studies Committee; Institutional Biosafety Committee  
 College level: Safety Committee; Outreach and Diversity Committee Lecturer  
 Department: Safety Committee (Chair); Outreach, Lab, & Undergraduate Committees (Member)

## EXTRAMURAL RESEARCH LEADERSHIP

### *Department of Energy*

Reviewer, Office of Basic Energy Sciences, Sept. 2007, Oct 2009.

*Environmental Protection Agency*

Panelist, People, Prosperity & Planet, Washington, D.C., May 2006

*National Academy of Engineering*

Panelist, 2007 P3 Program, Washington, D.C., Apr 2007;

Invited Participant, Institutes of Medicine. Vaccine Production: Potential Engineering Approaches to a Pandemic", Cleveland, OH, Apr 10-11, 2006

*National Institutes of Health*

NANO Study Section, Oct '11;

Nanotechnology Study Section, Feb '11.

Biological Chemistry, Biophysics & Cell Biology Study Section: Jul '09, Nov '09, Apr '10, Sep '10.

*National Science Foundation*

ENG Directorate EEC/NERC Site Visit: Feb '12; EEC/NERC NANO Bio/healthcare: Dec '11; CBET Biophotonics: Dec '09, Dec '10, Dec '11; CBET Biosensing: Sept '09; Apr '10, May '10, Nov '11; CBET/CAREER: Oct '11; ECCS/CAREER: Feb '11; CBET EFRI, Jan '11; CBET Biophotonics; CAREER, Sept '09; Sept '10; External reviews '05, '07, '11.

MPS Directorate: MPS/DMR Electronic and Photonic Materials, Jan '12.

Intra-agency: MRI, May '12.

## INDUSTRIAL TEAM AND COMMITTEE LEADERSHIP

*Merck Research Laboratories (Merck)*

Chair, New Pneumovax®23 Formulation Subteam, Merck Bioprocess R&D, 1998:

- Organized analytical, clinical, manufacturing and licensing efforts to formulate and fill clinical product.

Co-chair, Academic Seminar Committee, Merck Bioprocess R&D, 1997-98

- Committee member for *Membrane Separation Workshop*, West Point PA, Jun 29, 1998.
- Organized & conducted *MRL Chromatography Workshop*, West Point PA, Oct 13-14, 1997.
- Conducted & sponsored *Vmax Method for Filter Analysis Seminar*, West Point, PA, Feb 25, 1997

User Lead, Micro/Ultrafiltration Pilot Plant Skids, Merck Bioprocess R&D, 1997-98

- Drafted P&IDs & set specifications for 10 pilot-scale MF/UF skids, a \$1.2MM project.

Department Representative, Safety Committee, Merck Bioprocess R&D, 1996-98

- Organized & conducted *BPR&D Engineering Safety Standown*, West Point PA, Nov 6, 1997.
- Prepared chemical hygiene plan. Produced safety video. Coordinated quarterly lab safety inspections.

## STATE AGENCY APPOINTMENTS

*Academy for Math, Engineering and Science* (Salt Lake City, UT): Panelist, Nov 15, 2005.

*Arkansas Commercialization Retreat*: Invited Participant, Winthrop, AR, July 15-17, 2012.

*Arkansas Institute for Nanoscale Material Science and Engineering*: Advisory Committee, Apr '10.

*Maryland Technology Development Corporation*: Reviewer: Univ. Technology Development Fund '03

*Utah Campus Compact Board of Regents*: Lecturer; Contributor, State of Engagement Report, 2006

*Utah Governor's Office of Economic Development*: Participant, Gene technologies, May '06

**PROFESSIONAL ACTIVITIES****INVITED MEMBERSHIPS IN ACADEMIES AND INSTITUTES**

Fellow, American Institute for Medical and Biological Engineering, 2014  
 Member, Arkansas Academy of Science, 2013

**MEMBERSHIPS IN INSTITUTES, CENTERS, AND INTERDISCIPLINARY GRADUATE PROGRAMS**

Arkansas Institute for Nanoscale Materials Science and Engineering, 2008 - current  
 University of Arkansas Biomedical Engineering Graduate Program, 2010 - current  
 University of Arkansas Cell and Molecular Biology Graduate Program, 2009 - current  
 Center for Semiconductor Physics in Nanostructures (C-SPIN), 2010 - 2012  
 University of Arkansas Microelectronics/Photonics Graduate Program, 2008 – current  
 University of Arkansas High Density Electronics Center (HiDEC), 2010 - current

**PROFESSIONAL SOCIETY MEMBERSHIPS AND ACTIVITY**

*American Association for the Advancement of Science*

*American Chemical Society*

Moderator, *Optical Science and Emerging Energy Technol.*, ACS Ann Meeting, Mar 22-26, 2010.  
 Session Co-Chair, Inorganic Section, ACS Ann Mtg, San Francisco, CA, Mar. 22-26, 2010  
 BIOT representative, San Francisco, CA, Mar 2009

*American Institute of Chemical Engineers*

Session Chair: *AIChE Annual Meeting*, Minneapolis, MN, Oct 16-21, 2011  
 Coordinated Plenary Lecture: *AIChE Annual Meeting*, Minneapolis, MN, Oct 16-21, 2011  
 Invited Plenary Lecturer: *AIChE Annual Meeting*, San Francisco, CA, Nov. 12-17, 2006  
 Co-Chair: Session on Viral Vaccines, Gene Therapy: *AIChE Ann Mtg*, Miami, FL, Nov 15-20, 1998  
 Vice-President & Secretary: *AIChE Student Chapter*, Brigham Young University, 1987-1989

*American Institute for Medical and Biological Engineering*

*American Society for Engineering Education*

*American Vacuum Society*

*North American Membrane Society*

Invited participant and advisor: Annual Meeting, Cleveland, OH, May 16-20, 1998

*Society for Biological Engineering*

*Tau Beta Pi*

Faculty Advisor: University of Utah Alpha Student Chapter, January 2002-2008

**PEER REVIEW ACTIVITIES**

<i>American Chemical Society (ACS) Applied Materials &amp; Interfaces: Oct 2010; Jan 2011; Jan 2012; Jul 2016</i>	<i>Journal of Engineering for Sustainable Development</i>
<i>American Chemical Society Nano: Jan 2012; Feb 2012</i>	<i>Journal of Materials Chemistry C: Apr 2014</i>
<i>American Chemical Society Symposium Series Analytical Chemistry</i>	<i>Journal of Nanophotonics: Jan 2016</i>
<i>Chemical Engineering Science</i>	<i>Journal of Physical Chemistry A/B/C: Feb 2009; Feb 2015; Mar 2016; Mar 2016; May 2016</i>
<i>Clinical Chemistry</i>	<i>Journal of Physical Chemistry B and C: May 2009; Aug 2011; Aug 2013; Nov 2013; Sep 2014</i>
<i>Crystals: Nov 2014</i>	<i>Journal of Physical Chemistry Letters: Dec 2013</i>

*Encyclopedia of Analytical Chemistry: Instrumentation and Applications*  
*IEEE Sensors: 2009*  
*John Wiley & Sons: Responsive Membranes and Materials: Dec 2011*  
*Journal of Applied Physics: Aug 2014*  
*Journal of Basic and Applied Physics: Nov 2014*  
*Journal of Biotechnology: Mar 2010*  
*Journal of Chromatography*  
*Journal of the Electrochemical Society: May 2014*  
*Langmuir: Oct 2011; Nov 2011; Nov 2013; Mar 2014; May 2014*  
*Materials: Apr 2015, Jun 2016*  
*Materials Research Bulletin: 2009*  
*Nano Letters: Oct 2010; Jan 2011*  
*Nano Letters: Oct 2010; Jan 2011*  
*Nano Research: Sept 2014*  
*Nanomaterials: May 2016*  
*Nature Communications: Jan 2014*  
*Optics Letters: 2013*  
*Sensors and Actuators: B. Chemical: 2007*  
*Separation Science & Technology*

#### PROFESSIONAL CONSULTATIONS

*Maxtec, LLC*, Salt Lake City, UT. Dec 2012: "Participation as NSF ERC affiliate" D. K. Roper  
*Evergreen Packaging, Inc.*, Fayetteville, AR. May 2012: "Nanocellulose in packaging" D. K. Roper  
*Maxtec, LLC*, Salt Lake City, UT. May 2011, Sept 2011: "Redox activity in gold plating" D. K. Roper  
*Maxtec, LLC*, Salt Lake City, UT. Nov 2010: "Electroless gold plating" D. K. Roper  
*Pel Freez*, Rogers, AR. Jan 2010: "NP-enhanced detection of MRSA" D. K. Roper  
*AAF International*, Fayetteville, AR. Jan 2009: "Urea-formaldehyde resin on glass fiber" D. K. Roper  
*Frontier Sci.* Logan, UT, July 2006: "Precipitation & Crystallization of Chlorin E6/Aptocine™ " D. K. Roper  
*Maryland TEDCO*, Columbia MD, Sept 2003: "High-Throughput Bioreactor Systems" D.K. Roper  
*Millipore Corp.*, Bedford MA, July 2003: "Colloidal Effects in Adenovirus Purification" D.K. Roper  
*Pall Gelman Corp.*, Pensacola FL, May 2003: "Virus Recovery on Membrane Adsorbers" D.K. Roper  
*Millipore Corp.*, Bedford MA, May 2003: "Adenovirus Preparation & Purification" D.K. Roper  
*DataChem Corp.*, Salt Lake City UT, May 2003: "Biofilm Inhibits Hemin Effects on *S. aureus*" D. K. Roper  
*Energy Resources*, Salt Lake City UT, Apr 2003: "Aqueous Acid Waste Oxidation" D.K. Roper  
*Morinda Inc.*, Orem UT, Aug 2002: "Antimicrobials & Sporicides against *Bacillus* & *Staph*" D.K. Roper  
*Sartorius Corp.*, Smithtown NY, Sept 1994: "Scale-Up Studies on Membrane Adsorbers" D.K. Roper  
*Millipore Corp.*, Bedford MA, May 1994: "Improved Design for MemSeps" D.K. Roper & E.N. Lightfoot  
*Promega Corp.*, Fitchburg WI, May 1992: "Design Protein Chrom by NMR." D.K. Roper & E.N. Lightfoot

#### CONFERENCE AND CONFERENCE SESSIONS ORGANIZED

Conference Co-Organizer, NSF Workshop for Bridging Workforce Development: Arlington, VA. Feb 25-26, 2016.  
 Session Chair, Progress in Nanotechnology, Arlington, VA, Dec 9-10, 2015. "Outcomes from Nanosystems Engineering Research Centers"  
 Conference Organizer, NSF ERC Director's Retreat: Arlington, VA, Oct 27-28, 2015.  
 Conference Organizer, NSF ERC 30<sup>th</sup> Anniversary Celebration: Arlington, VA, Oct 28, 2015.  
 Session Co-Chair, Progress in Nanotechnology, Arlington, VA, Dec 9-10, 2014. "Outcomes and legacy of NSEC class of 2003 and 2004"  
 Conference Organizer, NSF ERC Biennial Meeting: "Building Tomorrow's Leaders", Arlington, VA, Oct 27-28, 2014.  
 Session Co-Chair, NSF ERC Biennial Meeting, Arlington, VA, Oct 27-28, 2014. "Biotech and healthcare engineering research centers."

Conference Co-Organizer, DFG-NSF: “New Perspectives of Neurotechnology and Neuroengineering”, Washington, D.C., Nov 13-14, 2014.

Session Organizer, NSF ERC ILO Retreat, Austin, TX, Jun 19-20, 2014. “Intellectual property considerations of emerging technologies in synthetic biology and semiconductor research”

Session Co-Organizer: CMOS-ET, Whistler, BC, Canada, July 17-19, 2013

Session Chair, CMOS-ET, Whistler, BC, Canada, July 17-19, 2013

Session Chair, NSF ERC Ann. Mtg. Bethesda, MD, Nov 14-16, 2012. “Privacy in biomedical data”.

Session Chair, *Nanomaterials in Medicine, Nanotechnology and Healthcare*, Jan. 6-9, 2010.

Moderator, 17<sup>th</sup> National Conference on Undergraduate Research Salt Lake City, March 13-15, 2003

#### PROFESSIONAL DEVELOPMENT

*Leadership Effectiveness Training*, Somerset NJ, May 28-30, 1997

*JMP Statistical Software Orientation*, West Point PA, May-Oct, 1997

*Process Filtration for Pharmaceutical & Biotechnology*, West Point PA, Oct 23, 1996

*New Manager Orientation, Management Practices*, West Point PA, Apr 23, 1996

*Immunology Workshops*, West Point PA, Apr 12, Apr 26 & May 10, 1996

#### TEACHER EDUCATION

Wally Cordes Teaching and Faculty Teaching Retreat at University of Arkansas, July 31-Aug 2, 2011

Chemical Engineering Faculty Retreat at University of Utah, December 9, 2005

1<sup>st</sup> Annual ASEE Workshop in Teaching Excellence at University of Utah, August 16, 2002

Team-Building Workshop at University of Utah, December 6, 2002 led by Prof. R. Layton

ASEE Summer School for Chemical Engineering Faculty, July 27-30, 2002, Boulder Co.

*Teaching Effectiveness for New Faculty Workshop* by Profs. P. Wankat and R. Felder

*Computer-aided Chemical Process Design and Process Simulation with Aspen Plus*, W. Seider

Share the Future IV Conference, March 2003, Tempe, Az

*Career Development Workshop for New Faculty* led by Tim Anderson, University of Florida.

*Teaching EC 2000 Skills: Integrating Student Outcomes a-k into Engineering Courses*, Russ Pimmel,

*Entrepreneurship Activities for Engineering Students and Faculty Members* led by David Barbe, UMCP

*The Assessment of Complex Outcomes of Learning* led by Dr. Tim Whitely

#### RESEARCH INTERESTS

*Engineer subatomic particle interactions* to increase functionality of electrostatics in bio-, nano- and metamaterials to (i) advance sensing, bio/neurotechnology, and imaging; (ii) modulate biological information, creating new ways to combat disease and induce cell and tissue responses; and (3) promote energy and water sustainability.

*Innovation*: cultivate academic-industry-govt. partnerships to translate discovery to disruptive innovation.

<b>RESEARCH GRANTS</b>	TOTAL	\$9,914,732 (\$4,433,880 to Roper as PI)
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	CURRENT	\$1,379,318 (\$1,379,318 to Roper as PI)
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#### *Extramural Awards*

NSF/DGE

Sr. PI: Roper

\$132,000

July 2014 – June 2017

Plasmon-enhanced quantum effects in nanomaterials for sustainable biologicals – GRFP advisor.

NSF/EEC 1260301-003 Biomedical, Manufacturing, and Health Care Sectors	PI: Roper	\$188,639	Aug 2015 – Aug 2016
NSF/DGE Energetic manipulation of plasmonic metamaterials for tunable photonic emission – GRFP advisor.	Sr. PI: Roper	\$132,000	July 2014 – June 2017

*Intramural Awards*

Univ Ark Vice Provost for Research Electromagnetic coupling with transport phenomena in biomolecular nanoplasmonics	PI: Roper	\$550,000	Aug 2008 – Aug 2016
<ul style="list-style-type: none"> <li>Established new electron optics facilities (SEM, Raman, NIL, CVD, microspectroscopies) to support College of Engineering</li> </ul>			
Univ Arkansas Foundation Electromagnetic coupling in subwavelength nanostructures	PI: Roper	\$200,000	Aug 2008 – Aug 2016
Univ Ark Dept of Chem Eng Endowed Chair: Charles W. Oxford Professor of Emerging Technologies	PI: Roper	\$160,000	Aug 2008 – Aug 2016
<ul style="list-style-type: none"> <li>Established international collaborations and affiliations with faculty in Canada, China, France, Egypt, Germany, India, Mexico, UK</li> </ul>			
Univ Ark Honors Coll SURF Characterizing Plasmonic Scattering of Nano-Composite Media by Variable Wavelength Beam Profiling	PI: Roper	\$4,000	Jan 2015 – Jun 2016
NSF/EEC 1260301 Cost Share Biomedical, Manufacturing, and Health Care Sectors	PI: Roper	\$9,929	Aug 2015 – Aug 2016
Univ Ark Honors Coll SURF Plasmonic Pervaporation for Sustainable Mixture Separation	PI: Roper	\$2,750	Feb 2016 – Jun 2016

COMPLETED                      \$8,535,414 (\$3,054,562 to Roper's Lab)

*Extramural Awards*

NSF/ASTA Electromagnetic modeling of tapered optical fibers for biosensing applications.	PI: Roper	\$6,000	Jan 2015 – Jul 2015
NSF/DGE Plasmon-enhanced harmonic generation for 2D metamaterials	Sr. PI: Roper	\$5,000	June 2015 – Sept 2015
NSF/EEC 1260301-002 Biomedical, Manufacturing, and Health Care Sectors	PI: Roper	\$197,264	Aug 2014 – Aug 2015
NSF/CBET 1134222 A Self Assembled Nano-array Platform for Membrane Protein Sensors and Analytics	PI: Roper	\$330,000	Sept 2011 – Aug 2014
NSF/ECCS 1006927 Modeling and Fabricating Nanotoroid Antenna Pairs to Plasmon-Enhance Solar Photovoltaics	PI: Roper	\$359,999	July 2010 – June 2014
<ul style="list-style-type: none"> <li>Awarded 2<sup>nd</sup> place, 2013 DOE Innovation in Fuel Cycle Research Award for <i>APL</i> publication</li> </ul>			
NSF/ECCS 1006927 Modeling and Fabricating Nanotoroid Antenna Pairs: REU Supplement	PI: Roper	\$12,500	June 2013 – July 2014
NSF/EEC 1260301 Biomedical, Manufacturing, and Health Care Sectors	PI: Roper	\$194,535	Aug 2013 – Aug 2014
Arkansas Space Grant Consortium Plasmonic Pervaporation for Wastewater Recycling.	PI: Roper	\$6,450	July 2013 – June 2014



NSF/EEC 5069-105	PI: Roper	\$192,933	Aug 2012 – Aug 2013
Biomedical, Manufacturing, and Health Care Sectors			
NSF/EEC 1138248	co-PI: Roper	\$200,000	Sept 2011 – Aug 2013
NUE: Integrating Nanotechnology into Undergraduate Education (\$15,000 cost share to Roper)			
<ul style="list-style-type: none"> <li>Developed new undergraduate minor in Nanotechnology with a curriculum including a new undergraduate nanotechnology lab.</li> </ul>			
NSF/DBI	Sr. Investigator: Roper	\$288,865	Mar 2011 – Feb 2014
REU Site: Applied Biotechnology in Life Sciences ( <a href="http://cemb.uark.edu/REU">http://cemb.uark.edu/REU</a> )			
Arkansas Bioscience Institute	co-PI: Roper	\$50,000	May 2012 – May 2013
Scale-able production of conjugated linoleic acid rich soybean oil.			
NSF/CMMI 0909749	PI: Roper	\$219,989	Sept 2008 – Sept 2012
Gold Nanoparticle Ensembles on Optical Plasmon Capillaries for Virus/DNA Sensing			
NSF/DGE 0957325	Sr. PI: Roper	\$121,500	Sept 2009 – Sept 2012
Advisor to GRF recipient to model thermoplasmonics in composite nanomaterials.			
Arkansas Dept of Higher Ed	PI: Roper	\$4,000	Aug 2011 – Aug 2012
Effect of local dielectric on electromagnetic properties of nanoparticle arrays.			
NSF/ECCS 1137049	PI: Roper	\$6,000	May 2011 – Aug 2011
Modeling Nanotoroid Antenna Pairs to Plasmon Enhance Solar Photovoltaics			
Arkansas Bioscience Institute	PI: Roper	\$28,400	July 2010 – Apr 2011
Detecting Biomarkers for Treating Disease using Plasmons.			
NSF/EPS 1003970	Sr. Investigator: Roper	\$3,307,897	Oct 2010 – Sept 2011
Green Renewable Energy Efficient Nanoplasmonic Solar Cells (\$68,944 cost share to Roper)			
NSF/ASTA	PI: Roper	\$5,500	Jan 2011 – Jul 2011
Fabricating plasmon metamaterials for biomarker detection			
NSF/CMMI 0941677	PI: Roper	\$41,205	Sept 2009 – Sept 2010
Gold Nanoparticle Ensembles on OPCs for Virus/DNA Sensing Supplement			
DAAD RISE	PI: Roper		
Thermoplasmonics for separations (Dortmund)	\$5,200	Aug 2011 – Oct 2011	
Plasmon NP Biosensors (Freiberg)	\$5,200	Aug 2011 – Oct 2011	
Opto-plasmonic sensors	\$3,400	Aug 2010 – Oct 2010	
Thermoplasmonics in H <sub>2</sub> fuel cell catalysis	\$3,400	July 2009 – Sep 2009	
NSF/DUE 0652982	co-PI: Roper	\$1,998,012	Sept 2007 – Aug 2012
Utah's Engineers: A statewide initiative for growth (\$238,878 cost share to Roper)			
NIH/NIBIB	PI: Roper	\$145,541	Mar 2006 – Mar 2008
Millisecond PCR with femtomolar detection sensitivity using surface plasmon resonance			
NSF/ECCS	PI: Roper	\$126,913	Jun 2007 – Jun 2008
Nanophotonic Superpolariton Junctions			
Governor's Office of Economic Dev.	PI: Roper	\$25,000	Jul 2007 – Jul 2008
Biomolecular Nanophotonics			
Frontier Scientific, Inc.	PI: Roper		
Chlorin E <sub>6</sub> for photodynamic cancer therapy II	\$108,894	May 2007 – May 2008	
Chlorin E <sub>6</sub> for photodynamic cancer therapy I	\$101,361	Dec 2006 – Dec 2007	
Governor's Office of Economic Dev.	PI: Roper	\$10,000	Dec 2006 – Jul 2007
Biomolecular Nanophotonics			
NAE/IOM Travel Grant	PI: Roper	\$790	Apr 2006
Vaccine Production: Potential Engineering Approaches to a Pandemic			
EPA 2004-P3-S5 Award	PI: Roper	\$10,000	Sept 2004 – Sept 2005
Photoelectrochemical hydrogen production prototype			

Millipore Corp.	PI: Roper	\$29,721	Dec 2003 – May 2004
Adenovirus Type 5 - surface binding, elution and equilibrium measured by surface plasmon resonance			
AMES Academy	PI: Roper	\$2,500	Sept 2004 – May 2005
Hydrogen Sustainability: ChEn 4975			
Western Alliance (WAESO)	PI: Roper	\$2,731	May 2003 – Aug 2003
Adenovirus Type 5 - surface binding, elution and equilibrium measured by surface plasmon resonance			
Merck Institute for Sci Ed	PI: Roper	\$2,000	Aug 2001
Cambridge technologies microplate fluorometer to quantitate fluorescent probes in cell-based assays			
Merck Research Laboratories	co-PI: Roper	\$53,020	Feb 1998 – Feb 1999
Computer modeling vaccine process development with Batch Plus® and SuperPro Designer® software.			

#### *Intramural Awards*

Univ Arkansas Honors College	co-PI: Roper	\$25,000	Nov 2011 – Aug 2012
Integrating Nanotechnology into Honors Education (\$3,600 cost share to Roper)			
Univ Arkansas Honors College	PI: Roper	\$3,900	Jan 2012 – Dec 2012
Fabricating Ordered Nanoparticle Lattices by Metal Reduction in Solution			
Univ Arkansas Honors College	PI: Roper	\$4,900	Feb 2010 – Dec 2010
Undergraduate Research Grant: Optical vapor detection using Au NP arrays			
U of AR: UG Research Grant	PI: Roper	\$3,900	Jan 2009 – Sep 2009
Nanolithography of plasmonic surfaces			
University of Utah College of Engineering		\$165,000	Jul 2001 - Jul 2008
Adenovirus cell-culture propagation, purification and analysis in gene therapy			
UofU Funding Incentive Seed Grant	PI: Roper	\$26,000	Jun 2007 – Jun 2008
Optical and conductivity properties of nucleotides in nanoparticle-coated glass nanopores			
UofU Catalyst Award	Co-PI: Roper	\$50,000	Dec 2007 – Dec 2008
MRI-guided Non-invasive Ultrasound-based Thermal Therapies			
UROF	PI: Roper		
Optical capillaries for polymerase chain reaction		\$1,200	May 2007 – Dec 2007
Au optical fibers for superpolariton heating		\$1,200	Jul 2007 – Dec 2007
Au NP and DNA primers on silica surfaces		\$1,200	Sep 2006 – May 2007
DNA hybridization and elongation rates using SPR		\$1,200	Jan 2006 -Aug 2006
DNA hybridization by oligo-modified AuNP		\$1,200	Jan 2006 -Jun 2006
Au-quenched Qdots for polymerase chain reaction		\$1,200	May 2006 -Aug 2006
TiO <sub>2</sub> NP Electrocatalysis to split H <sub>2</sub> O to H <sub>2</sub>		\$1,050	Sept 2004 – May 2005
H <sub>2</sub> Sustainability: Solar Voltaic Panel Construction		\$1,050	Sept 2004 – May 2005
Remote Control of Viral Vectors for Gene Therapy		\$1,050	Jan 2004 - May 2004
SPR to optimize Ad5 adsorption on Heparan Sulfate		\$1,200	Aug 2003 – Dec 2003
Maximizing Ad5 HEK Cell Transduction		\$1,200	Jan 2004 – May 2004
Adsorption of Ad5 on HEK Cells for Gene Therapy		\$600	May 2003 – Aug 2003
Adenovirus type 5 viral vectors for gene therapy		\$600	Jan 2003 – Jun 2003
Synergy Interdisciplinary Award Collaborator		\$12,500	Jul 2006 - Sept 2007
Urban Systems Research: Wireless monitoring for residential and neighborhood utility use			
Microfabrication Seed Fund	PI: Roper	\$6,500	Mar 2006 -May 2006
In-situ induction and monitoring of polymerase chain reaction by micro surface plasmon resonance			
Bennion Service Learning Ctr	PI: Roper	\$2,500	Sept 2004 – May 2005
Hydrogen Sustainability Service Learning Course: Ch En 4975 Photovoltaic hydrogen production prototype			
Chemical Engineering Dept	PI: Roper	\$3,500	Sept 2004 - May 2005
Hydrogen Sustainability ChEn 4975: Travel Assistance & Materials of Construction			

CLEAR Ethnographic & Teamwork Consultation for Hydrogen Sustainability, Ch En 4975	PI: Roper	\$4,032	Sept 2004 - May 2005
Chemical Engineering Dept ChEn 4253: Student/Industry Partnership Liaison (J. Peterson)	PI: Roper	\$1,250	Aug 2003 – Dec 2003
University Teaching Committee Team-based Industrial Partnerships in Senior Process Design: ChFEN 4253	PI: Roper	\$1,212	June 2003

## INVITED LECTURES (65 invited lectures to date)

### INTERNATIONAL

1. Georgia Innovation and Technology Agency. Arlington, VA. Mar. 28, 2016: “Engineering Research Centers”. D.K. Roper
2. Japan Science and Technology Agency/Ministry of Education, Culture, Sports, Science and Technology. Arlington, VA. Mar. 4, 2016: “Engineering Research Centers: Industry Collaborations”. D. K. Roper
3. US-Ireland Energy Research Workshop, Dublin, Ireland, Oct 15-16, 2015: “Engineering Research Centers”. D. K. Roper
4. KAUST Center Education Retreat, Saudi Arabia, Dec 2-4, 2014: “Integrating education and research”. D. K. Roper
5. CMOS ET, Whistler, B.C. Canada, July 17-19, 2013: “Electron optics of self-assembled nanocomposite metamaterials”. D. K. Roper
6. VI National Symposium: Chemistry in your world. Universidad de Baja California, Tijuana, Mexico, Oct 8-11, 2012: “Nanotechnology in bio/chemical engineering for a sustainable future”. D. K. Roper
7. IX International Symposium of Chemical Engineering of ESIQIE, Instituto Politécnico Nacional. Mexico City, Mexico, May 22-24, 2012: “Separation Process Principles: Bio/Chemical Operations”. D. K. Roper
8. CHEMCON 2012. Ambedkar National Institute of Technology, Jalendhar, India Dec 27-30, 2012: “Thermoplasmonic metamaterials for nanoscale intensification of sustainable bio- and chem-processes.” D. K. Roper
9. 2011 CMOS *Emerging Technologies Workshop*, Whistler, BC, Canada. Jun 15-17, 2011: “Enhanced spectral sensing by electromagnetic coupling with localized surface plasmons on subwavelength structures” D. K. Roper

### NATIONAL/FEDERAL

10. SEE Engineering Research Council Annual Conference. Bethesda, MD, Mar. 7-9, (2016). “Winning Large NSF Proposals”. D. K. Roper
11. NSF Workshop for Building Tomorrow’s Leaders: Bridging workforce development in ERCs to meet demand for a skilled workforce. Arlington, VA. Feb 25-26, 2016: “Creating Tomorrow Together, Today: Mind the Gap”. D. K. Roper and D. Jackson
12. Mayo Clinic BRAIN Initiative Symposium., Rochester, MN. Oct. 9-10, 2015: “Brain research through advancing innovative neurotechnologies.” D. K. Roper
13. NSF ERC Industry Liaison Officers Summit. Stanford University, CA. July 13-14, 2015: “ERC Program status and future perspectives.” D. K. Roper
14. NSF-NIH Workshop for Integrative Additive Biomanufacturing and Tumor Engineering. Bethesda, MD. Apr 1-2, 2015: “Challenges in additive biomanufacturing and tumor engineering”. D. K. Roper
15. Science Foundation Ireland: Research for Ireland’s Future. Washington, D.C. Mar 16, 2015: “Engineering Research Centers – Center-to-center collaborations”. D. K. Roper
16. Business of Biotechnology, Arlington, VA, Jan 7, 2015: “Synthetic Biology in the ERC Program” D. K. Roper
17. 2014 ERC Biennial Meeting, Arlington, VA, Oct 27-28, 2014: “State of the ERC Program at NSF” D. K. Roper
18. 2014 NSF ENG Advisory Committee Meeting, Arlington, VA, Oct 19, 2014. D. K. Roper
19. 2014 SPIE Optics and Photonics, San Diego, CA., Aug 17-21, 2014: “Biosensing and Nanomedicine IV: Electron optics of nanoplasmonic metamaterials in bio/opto theranostics”. D. K. Roper

20. NICT Forum: Brain Computer Interfaces, Washington, D.C., Jan 29, 2013: "CSNE: Forging neural pathways: engineering the interface between brains and technology". D. K. Roper
21. NIBIB Program Staff Meeting, Bethesda, MD, Jan 30, 2013: "National Science Foundation Engineering Research Centers: Biotechnology and Healthcare; Manufacturing". D. K. Roper
22. 2012 ERC Annual Meeting, Bethesda, MD, Nov. 14-16, 2012. "Connecting with the wider world in a bigger way". D. K. Roper
23. Engineering Education and Centers (EEC), *National Science Foundation*, Arlington, VA, Apr 10, 2012: "ERC Bioengineering/Biomedical Engineering". D. K. Roper
24. ACS Symposium, *Optical Science and Emerging Energy Technologies, ACS Spring Meeting*, San Francisco, CA. March 22, 2010: "Tuning plasmon-coupled radiation in nanolattices to bandgaps in the near-IR". D. K. Roper
25. AIChE Plenary Session I on Membranes & Bioseparations, *AIChE Annual Meeting*, San Francisco, CA, Nov 12-17, 2006: "Transport Phenomena in Viral Vectored Vaccines & Genome Sequencing". D. K. Roper

## REGIONAL/STATE

26. Resilient Coastal Infrastructure Workshop, Beaumont, TX, Apr 1, 2016: "Forming and managing federally-funded research centers." D.K. Roper
27. Inaugural SEC Symposium: Impact of the Southeast in the world's renewable energy future, Atlanta, GA Feb 10-12, 2013: "Plasmonic nanocomposite metamaterials for sustainable energy technologies". D. K. Roper
28. 56<sup>th</sup> Midwest Solid State Conference, *Univ of Oklahoma*, Oklahoma City, OK. Oct 8-10, 2010: "Ordered nanoarchitectures improve plasmon enhancement near semiconductor bandgaps in the near-IR". D.K. Roper
29. Utah Campus Compact, Board of Regents: Civic Engagement Retreat, Alta, UT, Aug 7-8, 2006, "Energy Sustainability through Hydrogen: A Univ of Utah/AMES Service Learning Experience". D. K. Roper
30. State of Utah. Governor's Office of Economic Development, Salt Lake City UT, May 30, 2006. "Surface Plasmon Resonance in Virus and Nucleic Acid Detection and Analysis". D. K. Roper

## UNIVERSITY/COLLEGE

31. Southern Virginia University. Buena Vista, VA. Apr. 9, 2016. 'National Science Foundation Funding'. D.K. Roper
32. George Mason University. Fairfax, VA. Apr 7, 2016. 'Functional Electrodynamics in nano-, bio-, and meta-materials.' D.K. Roper
33. ICTAS Seminar: Innovation frameworks and functional electrodynamics in nano-, bio-, and meta-materials. Virginia Polytechnic Institute and State University, Blacksburg, VA, Feb 1, 2016. D. K. Roper
34. Honors University Chemistry II Lecture, *Univ of Arkansas*, Mar. 6, 2012: "Plasmonic Nanocomposites: Materials, Probes, and Manufacturing" D. K. Roper
35. Freshman Engineering Program Colloquium, *Univ of Arkansas*, Fayetteville, AR, Nov 8, 2011: "Nanoscale metamaterials in energy, health, and informatics" D. K. Roper
36. Engineering National Advisory Council, *Univ Utah College of Eng* Salt Lake City, UT, Nov 15, 2002: "Engineering Prevention of Infectious Diseases and Treatment of Gene Defects" D. K. Roper

## DEPARTMENT

37. Dept. of Chemical Engineering, *Lamar University*, Beaumont, TX, Mar 31, 2016: "Functional electrodynamics in nano-, bio-, and meta-materials" D. K. Roper
38. Department of Food Science, *Univ of Arkansas*, Fayetteville, AR, June 29, 2012: "Electromagnetics in Bio/Chemical Processing" D. K. Roper
39. Dept of Chemical Engineering, *Univ of Arkansas*, Fayetteville, AR Apr 27, 2012: "Nanomaterials: New medicines, devices, electronics, & sustainable energies". D. K. Roper
40. Dept of Chemical Engineering, *Case Western Reserve University*, Cleveland, OH, Mar 8, 2012: "Plasmonic Nanocomposites: New materials, probes, and processes" D. K. Roper
41. Dept of Chem and Biological Engineering, *The Ohio State University*, Columbus, OH, Feb 16, 2012: "Plasmonic Nanocomposites: Materials, Probes, and Manufacturing" D. K. Roper

42. Dept of Chem Engineering, *Brigham Young Univ*, Provo, UT. Jan 26, 2012: "Plasmonic Nanocomposites: Materials, Probes, and Manufacturing" D. K. Roper
43. Dept of Physics, *Missouri State Univ*, Springfield, MO, Nov 17, 2010: "Tuning plasmon-coupled radiation in nanolattices to bandgaps in the near-IR" D. K. Roper
44. Dept of Materials Sci & Eng, *Univ of Utah*, Salt Lake City, UT, Nov 10, 2010: "Plasmon coupled coherent radiation in metamaterial nanolattices." D. K. Roper
45. Dept of Physics, *Univ of Arkansas*, Fayetteville, AR. Apr 10, 2009: "Electromagnetics and Transport in Nano/Bio for Health, Energy and Environment" D. K. Roper
46. Dept of Chemistry & Biochemistry, *Univ of Arkansas*, Fayetteville, AR. Feb 27, 2009: "Photon-plasmon Enhancement in Subwavelength Nanostructures" D. K. Roper
47. Ralph E Martin Dept of Chem Engineering, *Univ of Arkansas*, Fayetteville, AR. Feb 26, 2009: "Surface Plasmons in Nanoparticle Arrays" D. K. Roper
48. Dept of Chemistry & Biochemistry, *Univ of Arkansas*, Fayetteville, AR. Oct 28, 2008: "Electromagnetism and Transport in Nano- and Bio-technologies" D. K. Roper
49. Dept of Chem Engineering, *Brigham Young Univ*, Provo, UT. Feb 7, 2008: "Gold Films & Nanoparticles" D. K. Roper
50. Dept of Biological and Irrigation Engineering, *Utah State Univ*, Logan, UT, Jan 17, 2008: "Photonic Tunneling in Plasmon Capillaries" D. K. Roper
51. Depts of Biology & Biomedical Engineering, *Indiana Univ.*, Indianapolis, IN, Oct 19, 2007 "Nanoplasmonic photon transduction in Nanoparticles and Optical Fibers" D. K. Roper
52. Biomedical Engg Seminar *Univ Utah*, Salt Lake City, UT, Sept 8, 2006, "Surface Plasmon Resonance: Enhancing mass transport in bioanalysis & laser induction of energy transport in nanofluids" D. K. Roper
53. University of Utah Faculty Colloquia on Civically Engaged Scholarship, *Univ Utah*, Salt Lake City, UT, Sept 29, 2005: "Hydrogen Sustainability: an interdisciplinary service learning course" D. K. Roper
54. Dept of Pharmaceutics & Pharmaceutical Chemistry, *Univ Utah*, Salt Lake City, UT, Aug 29, 2005: "Adenovirus Binding Measured by Surface Plasmon Resonance" D. K. Roper
55. Math Biology Seminar, Department of Mathematics, *Univ Utah*, Salt Lake City, UT, Oct 19, 2004: "Adenovirus Binding Measured by Surface Plasmon Resonance" D. K. Roper
56. Chemical Engineering Graduate Seminar, *Univ Utah*, Salt Lake City, UT, Oct 19, 2004: "Adenovirus Binding Measured by Surface Plasmon Resonance" D. K. Roper
57. Dept of Chemical Engineering Lindsay Lecture Series, *Texas A&M University*, College Station, TX, Feb 6, 1998: "Process Development for Vaccines" D. K. Roper
58. Dept of Chemical Engineering, *Colorado State University*, Fort Collins, CO, Apr 11, 1997: "Challenges for Chemical Engineers in Biological Process Development" D. K. Roper
59. Dept of Chemical Engineering Graduate Student Seminar, *Brigham Young University*, Sept 21, 1995: "Membrane Chromatography: Mass-Transport Analysis & Application to Bioseparations" D. K. Roper

#### INSTITUTIONAL

60. MRS Student Chapter, Fayetteville, AR. *Univ of Arkansas*, Apr 8, 2010: "Tuning plasmon-coupled radiation in nanolattices to bandgaps in the near-IR" D. K. Roper
61. Kilby Laboratory, *Texas Instruments, Inc.*, Dallas, TX. Jun 10, 2009: "Synchronous radiative enhancement of digital light processing" D. K. Roper
62. *Investor's Choice Conference*, Salt Lake City, UT, Feb 8, 2007 "Biomolecular Nanophotonics"
63. Utah Museum of Natural History, Salt Lake City, UT, June 21, 2006, "Photovoltaic Hydrogen Production for Sustainable Fuel Cells" D. K. Roper
64. Sci & Lab Services, *Pall Corp.*, Port Washington, NY, Mar 11, 1998: "Designing Membrane Adsorbers" D. K. Roper
65. Membrane Technology Center, *Pall Gelman Sciences*, Pensacola, FL, Jan 8, 1998: "Membrane Adsorption in Pharmaceutical Processes" D. K. Roper

#### INTERNATIONAL INTERACTIONS (48+ International Interactions)

## AMERICAS

1. CMOS Emerging Technologies, Whistler, BC Canada. D.K. Roper invited to co-organize, co-chair, and lecture at 2013 Conference. Jul 17-19, 2013 by Dr. Kris Iniewski.
2. Universidad de Baja California. Tijuana, Mexico. D.K. Roper invited to meet with faculty and administrators and lecture at VI National Symposium: Chemistry in your world. Oct 8-11, 2012.
3. Instituto Politécnico Nacional. Mexico City, Mexico. D.K. Roper invited to give plenary lecture at IX Int'l Symposium of Chemical Engineering of ISIQIE by Prof. Luis Alejandro Galicia Luna May 21-26, 2012.
4. CMOS Emerging Technologies, Coquitlam, BC V3B 0G3 Canada. D.K. Roper invited to author book chapter and lecture at 2011 Conference by Dr. Kris Iniewski. Jun 15-17, 2011.

## ASIA

5. Japan Science and Technology Agency. D.K. Roper discussed developing interdisciplinary federally funded university-industry centers with Dr. Takanori Hirao, Director, Terumasa Matsunaga, Manager, Junya Tanimoto, MEXT, JST Program Office in Arlington, VA Mar 3, 2016.
6. National Natural Science Foundation of China (NSFC). D.K. Roper discussed ERC program with Dr. Zou Liyao, Deputy Director-General, Bureau of International Cooperation, in Arlington, VA Dec 8, 2015.
7. Qatar National Research Fund (QNRF). D.K. Roper discussing collaborations between QNRF and NSF.
8. Japan Science and Technology Agency (JST). D.K. Roper discussed ERCs with Drs. Susumu Ohtuka, Toshiya Ohtake, and Shigeru Kitaba (Director, D.C. office) in Arlington, VA, Jan 7, 2015.
9. King Abdulla University of Science and Technology (KAUST). D.K. Roper invited to co-chair retreat to implement graduate education into graduate research in Thuwal, Saudi Arabia, Dec 2-4, 2014
10. Japan Science and Technology Agency (JST). D.K. Roper invited to discuss ERC program with Prof. H. Kimura and colleagues in Arlington, VA, June 2, 2014.
11. National Institute of Information and Communications Technology of Japan (NICT). D.K. Roper invited to speak on brain computer interfaces by C. Wood, Washington CORE Research. Jan 29, 2013.
12. Indian Institute of Technology - Delhi. New Delhi, India. D.K. Roper invited to discuss sustainable bio/chem processing with chemical and mechanical engineering faculty. Dec. 27, 2012.
13. Ambedkar National Institute of Technology, Jalendhar, India. D.K. Roper invited to give Perkin Elmer's Prof. Ro Kumar CDS Distinguished Lecture at CHEMCON 2012, Dec 28, 2012.
14. University of Electronic Science and Technology, Chengdu, People's Republic of China. D.K. Roper invited to author a chapter in *Nanodroplets Science and Technology* by Z. M. Wang, Nov. 2012.
15. Indian Institute of Science, Bangalore, India. D.K. Roper invited to speak at ANCRISST 2012 by Prof. Ananth Ramaswamy. July 27-28, 2012.
16. Indo U.S. Collaboration for Engineering Education. D.K Roper invited to participate in education and research collaborations by Prof. Krishna Vedula, Dec 2010.

## EUROPE

17. Georgia Innovation and Technology Agency: D.K. Roper discussed establishment of Georgia's first biotechnology center with Irakli Kashibadze, Chairman, Avtandil Kasradze, Deputy Chairman, Arlington, VA, Mar 28, 2016.
18. Royal Dublin Society (RDS): D.K. Roper discussed engineering research centers with representatives from EirGrid Group, Dublin, Ireland, Oct 15-16, 2015.
19. Swiss National Science Foundation (SNSF). D.K. Roper discussed engineering research centers with Dr. Martin Vetterli, President, SNSF. Arlington, VA Oct 6, 2015.
20. RWTH Aachen University. D.K. Roper discussed engineering research centers with Dr. Ernst Schmachtenberg, Rector, Pittsburgh, PA Sept 1, 2015.
21. TU Berlin. D.K. Roper discussed engineering research centers with Prof. Dr. Angela Ittel, Vice President for International and Teacher Education, Pittsburgh, PA Sept 1, 2015.

22. TU Braunschweig. D.K. Roper discussed engineering research centers with Prof. Dr.-Ing. Peter Hecker, Institute Director, Pittsburgh, PA Sept 1, 2015.
23. TU Dresden. D.K. Roper discussed engineering research centers with Prof. Dr.-Ing. Hans Muller-Steinhagen, Rector, Pittsburgh, PA Sept 1, 2015.
24. Leibnitz University Hannover. D.K. Roper discussed engineering research centers with Prof. Dr.-Ing. Volker Epping, President, Pittsburgh, PA Sept 1, 2015.
25. Karlsruhe Institute of Technology. D.K. Roper discussed engineering research centers with Prof. Dr.-Ing. Alexander Vohner, Pittsburgh, PA Sept 1, 2015.
26. TU Munich. D.K. Roper discussed engineering research centers with Prof. Dr.-Ing. Hana Mianov, Sr. V.P. for International Alliance and Alumni, Pittsburgh, PA Sept 1, 2015.
27. German Research Foundation, Washington D.C. D.K. Roper invited to discussion on research evaluation data and metrics with Dr. Anke Reinhardt, Director Evaluation and Monitoring, DFG Mar. 25, 2015
28. Science Foundation Ireland, Dublin 2, Ireland. D.K. Roper coordinated trilateral center-to-center activities with Dr. Aisling McEvoy. Dec 2014 - current
29. Department for Employment and Learning, Belfast, Northern Ireland, United Kingdom. D.K. Roper coordinated trilateral center-to-center activities with Ms. Claire Thompson. Dec 2014 - current
30. University of Geneva, Switzerland. D.K. Roper coordinated proposal for nonlinear microscopy of 2<sup>nd</sup> harmonic scattering from nanomaterials with Drs. Luigi Bonacina & Jean-Pierre Wolf. Sept 2014 – Jun 2016.
31. Trinity College, Ireland. D.K. Roper coordinated proposal for plasmon-enhanced harmonic generation for 2D metamaterials with Dr. Jonathan Coleman. Sept 2014 – Sept. 2016
32. German Research Foundation, Washington D.C. D.K. Roper co-organized 8<sup>th</sup> annual DFG-NSF Joint Meeting with Dr. Max Vögler, Director DFG Office North America. Nov. 13-14, 2014
33. German Embassy, Washington D.C. D.K. Roper invited to participate in lecture on energy. Jan. 8, 2014.
34. University of Freiburg, Baden Wurttemberg, Germany. BrainLinks BrainTools™. D.K. Roper coordinating sensorimotor neural engineering workshop with Dr. Simone Cardoso de Oliveira in 2014.
35. Technische Universitat Dortmund. Dortmund, Germany. Department of Chemical Engineering. D.K. Roper hosted DAAD RISE Visiting Scholar, Stefan Schwarz, Aug-Oct 2011.
36. Technische Universitat Bergakademie Freiburg. Freiburg, Germany. Department of Process Engineering. D. K. Roper hosted DAAD RISE Visiting Scholar, Sophie Kuhne, Aug-Oct 2011.
37. Karlsruhe Institute of Technology. Institute for Chemical Engineering. Prof. Dr. Manfred Doring. Biofuels and nanotechnology. Dec 2010.
38. Karlsruhe Institute of Technology. Faculty of Chemistry and Biochemistry. Prof. Dr. Stefan Brase, Dean. Chemistry for sustainable energy. Dec 2010.
39. Fraunhofer Institute for Chemical Technology. Dr. Stefan Troster. Extrusion and biological extraction. Dec 2010.
40. University of Heidelberg. Institute of Organic Chemistry. Prof. Dr. Stephen Hashmi. Organic chemistry. Dec 2010.
41. Max-Planck Institute for Polymer Research. Dr. Katharina Landfester. Nanoparticle synthesis. Dec 2010.
42. Federal Ministry of Education and Research, Bonn. Dr. Norbert Konig. Technology exchange. Dec 2010.
43. German Research Foundation. Dr. Markus Behnke. Collaborative funding opportunities. Dec 2010.
44. University of Bonn. Department of Chemistry. Dr. A.C. Filippou, Head. Organic chemistry. Dec 2010.
45. University of Aachen. Institute for Technical and Macromolecular Chemistry. Prof. Dr. Walter Leitner. Ionic liquids in biofuels. Dec 2010.

46. University of Hohenheim. Stuttgart, Germany. Department of Food Science and Biotechnology. D.K. Roper hosted DAAD RISE Visiting Scholar, Jara Obermann, Aug-Sept 2010.
47. University of Applied Science. Zwickau, Germany. Department of Microtechnology. D.K. Roper hosted DAAD RISE Visiting Scholar, Jenny Pestel, Aug-Sept 2009.

#### OCEANIA

48. Universite de la Polynesie Francaise. Département des Sciences. D.K. Roper discussed solar energy development with Dr. Alessio Guarino, Director. Dec 2008

#### TEXTBOOKS and BOOK CHAPTERS

1. J.D. Seader, E.J. Henley, **D.K. Roper**. Separation Process Principles, Chemical and Biochemical Operations. 2010. 3<sup>rd</sup> Ed. *John Wiley & Sons, Inc.* Hoboken NJ.
2. J.D. Seader, E.J. Henley, **D.K. Roper**. Separation Process Principles, with Applications Using Process Simulators. 2015. 4<sup>th</sup> Ed. *John Wiley & Sons, Inc.* Hoboken NJ.
3. **D.K. Roper**, P. Blake, D. DeJarnette, B. Hardin. Plasmon coupling enhanced in nanostructured chem/bio sensors. In *Nano-Plasmonics: Advanced Device Applications*. J.W.M. Chon and K. Iniewski, Eds. 2013. *CRC Press*. New York City, NY ISBN: 978-1-4665-1426-3
4. **D.K. Roper**. Self-assembly of nanodroplets in nanocomposite materials in nanodroplets science and technology. In *Nanodroplets*. Z. Wang, Ed. *Springer* (2014) New York City, NY. ISBN: 978-1-4614-9472-0
5. **D.K. Roper**, J.D. Seader, E.J. Henley. Bioseparation Process Principles. *John Wiley & Sons, Inc.* Hoboken NJ. In preparation.

#### PEER-REVIEWED PUBLICATIONS

*Citation statistics: 10+* (Y); *60+* (†). *Invited* (\*). *h-index* = 19. *i10-index* = 33.

*Undergraduate co-authors identified with superscript U.*

1. Forcherio, G.T., **Roper, D.K.** Spectral characteristics of noble metal nanoparticle-molybdenum disulfide heterostructures. *Adv. Opt. Mater.* (2016) DOI: 10.1002/adom.201600219.
2. Bejugam, V., Wei, X., **Roper, D.K.** Reductive spectrophotometry of divalent tin sensitization on soda lime glass. *Appl. Surf. Sci.* (2016) 376, 43-51.
3. Forcherio, G.T., DeJarnette, D., Sreeram, M.<sup>U</sup>, Blake, P.A., **Roper, D.K.** Coupled dipole plasmonics of nanoantennas in discontinuous, complex dielectric environments. *J. Quant. Spectr. Rad. Transf.* (2015) 166, 93-101.
4. Dunklin, J.R., Forcherio, G.T., **Roper, D.K.** Gold nanoparticle-polydimethylsiloxane thin films reflect light internally by optical diffraction and Mie scattering. *Mater. Res. Express* 2 (2015) 0085005. doi:10.1088/2053-1591/2/8/085005
5. Dunklin, J.R., Forcherio, G.T., Berry Jr., K.R., and **D.K. Roper**. Plasmon optics and thermal dissipation in nanocomposite thin films. *MRS Proceedings* (2015) 1788. DOI: 10.1557/opl.2015.662
6. Berry<sup>U</sup>, K., Dunklin, J., Blake, P.A., **Roper, D.K.** Thermal dynamics of plasmonic nanoparticle composites. *J. Phys. Chem. C.* (2015) 119(19) 10550-10557. DOI: 10.1021/jp512701v
7. Wei, X., Jang, G.-G., **D.K. Roper**. Spectrophotometric determination of tin(II) by redox reaction using 3, 3',5,5'-tetramethylbenzidine dihydrochloride and N-bromosuccinimide. *J. Anal. Chem.* (2015) 70(5) 566-572.
8. Lisunova, M., **Roper, D.K.**, Dunklin, J.R., Chen, J. Jenkins, S. V. The unusual photothermal response of free standing multilayered films based on plasmonic bimetallic nanocages. *R.S.C. Advances* (2015) 5 15719-15727. DOI: 10.1039/C5RA00682A.
9. DeJarnette, D., **Roper, D.K.** Electron energy loss spectroscopy of gold nanoparticles on graphene. *J. Appl. Phys.* (2014) 116, 054313.



10. Forcherio, G.T., Blake, P., DeJarnette, D., **Roper, D.K.** Nanoring structure, spacing, and local dielectric sensitivity for plasmonic resonances in Fano resonant square lattices. *J. Optics* (2014) 22 (15) 17791-17804.
11. DeJarnette, D., Jang, G.-G., Blake, P., **Roper, D.K.** Polarization angle affects energy of plasmonic features in Fano resonant regular lattices. *J. Optics* (2014) 16(10) 105006.
  - Spotlited in *ResearchGate*, 15 Sept 2015, with 461 downloads: <http://iopscience.iop.org/2040-8986/16/10/105006>
12. Lisunova, M., Wei, X., DeJarnette, D., Forcherio, G.T., Berry<sup>U</sup>, K., Blake, P., **Roper, D.K.** Photothermal response of plasmonic nanoconglomerates in assembled films by electroless plating. *R.S.C. Advances* (2014) 4(40) 20894-20901. DOI: 10.1039/c4ra03351e.
13. Blake, P.; Kuhne<sup>U</sup>, S.; Forcherio, G.; **D.K. Roper**. Diffraction in nanoparticle lattices increases sensitivity of localized surface plasmon resonance to refractive index changes. *J. Nanophotonics* (2014) 8(1) 083084. DOI:10.1117/1.JNP.8.083084.
  - Featured in *SPIE Newsroom*, 30 Sept 2014: <http://spie.org/x110281.xml>
14. <sup>Y</sup>Dunklin, J.; Forcherio, G.; Berry<sup>U</sup>, K.; **D.K. Roper**. Gold nanoparticle polydimethylsiloxane thin films enhance thermoplasmonic dissipation by internal reflection. *J. Phys. Chem. C* (2014) 118(14) 7523-7531. DOI: 10.1021/jp4112124
15. Wei, X.; **D.K. Roper**. Tin sensitization for electroless plating review. *J. Electrochem. Soc.* (2014) 161(5) D235-D242. DOI: 10.1149/2.047405jes
16. Dunklin, J.; Forcherio, G.; **D.K. Roper**. Geometric optics of gold nanoparticle-polydimethylsiloxane thin film systems. *Optical Materials Express* (2014) 4(2) 375-383.
17. Norman<sup>U</sup>, J., DeJarnette, D., **Roper, D.K.** Polylogarithm-based computation of Fano resonance in arrayed dipole scatterers. *J. Phys. Chem. C.* (2014) 118: 627-634. DOI: 10.1021/jp408706
18. <sup>Y</sup>DeJarnette, D., Blake, P., Forcherio, G., **Roper, D.K.** Far-field Fano resonance in nanoring lattices modeled from extracted dipole polarizability. *J. Appl. Physics* (2014) 115 024306.
19. Lisunova, M., Norman<sup>U</sup>, J., Wei, X., Jenkins, S., Chen, J., **Roper, D.K.** Aqueous dispersion of plasmonic hollow metal nanoparticles. *Materials Letters* (2014) 117(15) 241-243.
20. <sup>Y</sup>DeJarnette, D., Norman<sup>U</sup>, J., **Roper, D.K.** Attribution of Fano resonant features to plasmonic particle size, lattice constant, and dielectric wavenumber in square NP arrays. *Photonics Res.* (2014) 2(1) 15-23.
  - Selected for inclusion in *Spotlight on Optics*, Apr. 16, 2014. <http://www.opticsinfobase.org/spotlight/>
  - 3<sup>rd</sup> most frequently downloaded article from *Photonics Res.* in Mar.-Apr. 2014.
21. Lisunova, M., Norman<sup>U</sup>, J., Blake, P., Forcherio, G.T., DeJarnette, D.F., **Roper, D.K.** Modulation of Plasmonic Fano Resonance by the Shape of the NP in Ordered Arrays. *J. Phys. D: Appl. Phys.* (2013). 46(48), 485103.
22. <sup>Y</sup>Dunklin, J.; Forcherio, G.; Berry<sup>U</sup>, K.; and **D.K. Roper**. Asymmetric reduction of gold nanoparticles into thermoplasmonic polydimethylsiloxane thin films. *ACS Appl. Mat. Interf.* (2013) 5 (17) 8847-8466.
23. <sup>Y</sup>Forcherio, G.T. and **D.K. Roper**. Optical attenuation of plasmonic nanocomposites within photonic devices. *Appl. Optics* (2013) 52(25) 6417-6427.
24. Jang, G.-G., Blake, P., and **D.K. Roper**. Rate-limited electroless gold thin film growth: a real-time study. *Langmuir.* (2013) 29(18) 5476-5486. DOI: 10.1021/la304154u
25. <sup>Y</sup>DeJarnette, D., Norman<sup>U</sup>, J., **Roper, D.K.** Spectral patterns underlying polarization-enhanced diffractive interference are distinguishable by complex geometry. *Appl. Phys. Lett.* (2012) 101(18) 193104.

- Awarded 2<sup>nd</sup> place. 2013 DOE Innovation in Fuel Cycle Research Award
26. <sup>Y</sup>Jang, G.-G., Hawkrige, M., **Roper, D.K.** Silver disposition and dynamics during electroless metal thin film synthesis. *J. Mater. Chem.* (2012) 22, 21942-21953.
  27. <sup>Y</sup>Berry<sup>U</sup>, K., Russell, A., Blake, P., **Roper, D.K.** Gold nanoparticles reduced *in situ* and dispersed in polymer thin films: optical and thermal properties. *Nanotechnology.* (2012) 23, 375703.
    - Highlighted in *NSF Discovery: A Student's Road to Research* 13 Nov Sept 2012  
[http://www.nsf.gov/discoveries/disc\\_summ.jsp?cntn\\_id=126039](http://www.nsf.gov/discoveries/disc_summ.jsp?cntn_id=126039)
  28. <sup>Y</sup>Dejarnette, D., **Roper, D.K.**, and Harbin, B. Geometric effects on far-field coupling between multipoles of nanoparticles in square arrays. *JOSA B.* (2012) 29(1) 88-100.
  29. <sup>Y</sup>Blake, P., Obermann<sup>U</sup>, J., Harbin, B., and **D.K. Roper.** Enhanced nanoparticle response from coupled dipole excitation for plasmon sensors. *IEEE Sensors Journal.* (2011) 11(12) 3332-3340. DOI 10.1109/JSEN.2011.2158417
  30. <sup>Y</sup>Russell, A.G., McKnight<sup>U</sup>, M., Hestekin, J., and **D.K. Roper.** Thermodynamics of optoplasmonic heating in fluid filled gold nanoparticle plated capillaries. *Langmuir* (2011) 27(12) 7799-7805.
  31. <sup>Y</sup>Jang, G.-G. and **D.K. Roper.** Balancing redox activity allows spectrophotometric detection of Au(I) using tetramethylbenzidine dihydrochloride. *Anal. Chem.* (2011) 83(5) 1836-1842.
  32. <sup>Y</sup>Ahn, W. and **Roper, D.K.** Periodic nanotemplating by selective deposition of electroless gold island films on particle-lithographed dimethyldichlorosilane layers. *ACS Nano* (2010) 4(7) 4181-4189.
    - Highlighted in *Nanotechnology Weekly* 6 Sept 2010
    - Highlighted in *Issues in Nanoscience and Nanoscale Research*, 2011 edition
  33. Ahn, W., Blake, P., Schulz, J., Ware, M.E., **Roper, D.K.** Fabrication of regular arrays of Au nanospheres by thermal transformation of EL-plated films. *J. Vac. Sci. Technol. B* (2010) 28(3) 638-642.
    - One of the top 20 most read articles in June & July 2010
    - Highlighted in *Advances in Nanotechnology Research and Application*, 2011 edition
  34. <sup>Y</sup>Russell, A., McKnight<sup>U</sup>, M., Sharp<sup>U</sup>, A., Hestekin, J., **Roper, D.K.** Gold nanoparticles allow optoplasmonic evaporation from open silica cells. *J. Phys. Chem. C.* (2010) 114(22) 10132-10139. DOI 10.1021/jp101762n
  35. \*<sup>Y</sup>**Roper, D.K.**, Ahn, W., Taylor, B., D'Asen, Y. Enhanced spectral sensing by electromagnetic coupling with localized surface plasmons on subwavelength structures. *IEEE Sensors Journal* (2010) 10(3) 531-540.
    - Cited in in *LabScholars.com*, Sept. 2014
  36. <sup>Y</sup>Blake, P., Ahn, W., **Roper, D.K.** Enhanced uniformity in arrays of electroless plated spherical gold nanoparticles using tin presensitization. *Langmuir* (2010) 26(3) 1533-1538; DOI 10.1021/la903985m
  37. <sup>Y</sup>Jang, G.-G. and **D.K. Roper.** Continuous flow electroless plating enhances optical features of Au films and nanoparticles. *J. Phys. Chem C.* (2009) 113:19228-19236.
  38. Hoepfner<sup>U</sup>, M. and **Roper, D.K.** Describing temperature increases in plasmon-resonant nanoparticle systems. *J Thermal Anal & Calorimetry.* (2009) 98:197-202. DOI 10.1007/s10973-009-0316-9
  39. Yu, J., Blake, P., **Roper, D.K.** Tapered optical fibers designed for surface plasmon resonance phase-matching. *Langmuir.* (2009) 25 (1) 59-63.
  40. <sup>Y</sup>Ahn, W. and **Roper, D.K.** Transformed gold island film improves light-to-heat transduction of nanoparticles on silica capillaries. *J. Phys. Chem. C.* (2008) 112(32) 12214-12218.
  41. <sup>Y</sup>Ahn, W., Taylor, B., Dall-Asen, Y., **Roper, D.K.** Electroless gold island thin films: photoluminescence and thermal transformation to nanoparticle ensembles. *Langmuir* (2008) 24 (8) 4174 -4184.

42. \***Roper, D.K.**, Trujillo, E.M., Bradshaw<sup>U</sup>, R. Photovoltaic hydrogen production prototype: sustainable energy for residences. *J. Green Bldg.* (2008) 3(3) 133-141.
43. †**Roper, D.K.**, Ahn, W., Hoepfner<sup>U</sup>, M. Microscale heat transfer transduced by surface plasmon resonant gold nanoparticles. *J Phys Chem C.* (2007) 111(9) 3636-3641.
44. †**Roper, D.K.** Determining Surface Plasmon Resonance Response Factors for Deposition onto 3-D Surfaces. *Chem. Eng. Sci.* (2007) 62:1288-1996.
45. †**Roper, D.K.** Enhancing Lateral Mass Transport to Improve the Dynamic Range of Adsorption Rates measured by Surface Plasmon Resonance. *Chem. Eng. Sci.* (2006) 61(8) 2557-2564.
46. †**Roper, D.K.** and Nakra, S. Adenovirus type 5 intrinsic adsorption rates measured by surface plasmon resonance. *Anal Biochem.* 348 (2006) 75-83.
47. **Roper, D.K.** and Trujillo, E.M. Photovoltaic Hydrogen Production Prototype for Hydrogen Sustainability. *J. Eng. Sust. Dev.* 1 (2006) 77-84.
48. Bandolin<sup>U</sup>, N., **Roper, D.K.**, "Greens Function Analysis of Dispersion in Membranes", *Proceedings of The National Conference on Undergraduate Research (NCUR) 2003* University of Utah, Salt Lake City, Utah March 13-15, 2003.
49. Mayne<sup>U</sup>, J., Vance<sup>U</sup>, A., **Roper, D.K.**, "Hemin Inhibition of *Staphylococcus aureus* in Microplate Assays", *Proceedings of The National Conference on Undergraduate Research (NCUR) 2003* University of Utah, Salt Lake City, Utah March 13-15, 2003.
50. †Joyce, J.G., Abeygunawarda, C., Xu, Q., Cook, J.C., Hepler, R., Przysiecki, C.T., Grimm, K.M., **Roper, K.**, Ip, C.C.U., Cope, L., Montgomery, D., Chang, M., Campie, S., Brown, M., McNeely, T.B., Zorman, J., Maira-Litran, T., Pier, G.B., Keller, P.M., Jansen, K.U., and Mark, G.E., III. Isolation, structural characterization, and immunological evaluation of a high-molecular-weight exopolysaccharide from *Staphylococcus aureus*. *Carbohydrate Research* **338**(9) 22 April 2003, 903-922.
51. †Shanklin, T., **Roper, D.K.**, Yegneswaran, P.K., and Marten, M.R., "Selection of Bioprocess Simulation Software for Industrial Applications", *Biotechnol Bioeng. A* . **72**(4) (2001) 483-489.
52. Shanklin, T., Yegneswaran, P.K., **Roper, D.K.**, Yegneswaran, P.K., and Marten, M.R., "Evaluation of Process Simulation Software for Biotechnology Applications", *Pharmaceutical Online*, March 5, 1999.
53. \*†**Roper, D.K.** and E.N. Lightfoot, "Separation of Biomolecules using Adsorptive Membranes" (Review), *J. Chromatogr. A* . **702**(1-2) (1995) 3-26.
54. †Lightfoot, E.N., A.M. Athalye, J.L. Coffman and **D.K. Roper**, "Nuclear Magnetic Resonance and the Design of Chromatographic Separations", *J. Chromatogr. A* . **707**(1) (1995) 45-55.
55. †**Roper, D.K.** and E.N. Lightfoot, "Estimating Plate Heights in Stacked-Membrane Chromatography by Flow-Reversal", *J. Chromatogr. A* . **702**(1-2) (1995) 69-80.
56. **Roper, D.K.** and E.N. Lightfoot, "Mean Residence Time and Variance in Steady Counterflow Separations", *Chem. Eng. Sci.*, **49**(10) (1994) 1621-1630.
57. †Coffman, J.L., **D.K. Roper** and E.N. Lightfoot, "High-Resolution Chromatography of Proteins in Short Columns and Adsorptive Membranes", *Bioseparations* **4** (1994) 183-200.
58. **Roper, D.K.** and E. N. Lightfoot, "Comparing Steady-Counterflow Separation with Differential Chromatography", *J. Chromatogr. A*, **654** (1993) 1-16.
59. Wilson, H.L., **D.K. Roper**, W.V. Wilding, G.M. Wilson, "Boiling Point Measurements for Several Aqueous Solutions of Inorganic Salts", *NIPER*, P0 N15296, Aug. 22, 1989.
60. †Izatt, R.M., **D.K. Roper**, R.L. Bruening and J.D. Lamb, "Macrocyclic-Mediated Cation Transport Using Hollow Fiber Supported Liquid Membranes", *J. Membr. Sci.* **45** (1989) 73.

**CONFERENCE PROCEEDINGS**

61. G.T. Forcherio, P.T. Blake, M. Seeram, D. DeJarnette, **D.K. Roper**. Complex dielectric and geometry influences on plasmon excitation and energy transfer in nanocomposite systems. *Proc. SPIE 9756 Photonic and Phononic Properties of Engineered Nanostructures VI*, 975615. Mar. 14, 2016. Doi:10.1117/12.2211144.
62. **D.K. Roper**, Engineering Research Centers. *Proceedings of EirGrid-FREEDM Systems Center International Energy Research Workshop*, Dublin, Ireland. Oct. 15-16, 2015.
63. **D.K. Roper**, D. DeJarnette, G.T. Forcherio, J. Dunklin, K. Berry Jr., G.-G Jang, M. Lisunova, P.T. Blake, W. Ahn. Electron optics of nanoplasmonic metamaterials in bio/opto theranostics. *Proceedings of SPIE Optics + Photonics*, San Diego, CA. Aug. 17-21, 2014.
64. J. Mishler, P. Blake, A.J. Alverson, **D.K. Roper**, J. B. Herzog. Diatom frustule photonic crystal geometric and optical characterization. *Proceedings of SPIE Optics + Photonics*, San Diego, CA. Aug. 17-21, 2014.
65. G.T. Forcherio, D. DeJarnette, P. Blake, **D.K. Roper**. Polarizability extraction for rapid computation of Fano resonance in nanoring lattices. *Proceedings of SPIE Optics + Photonics*, San Diego, CA. Aug. 17-21, 2014.
66. G.T. Forcherio, **D.K. Roper**. Optical attenuation of plasmonic Au-PDMS nanocomposite thin-film devices. *Proceedings of SPIE Optics + Photonics*, San Diego, CA. Aug. 17-21, 2014.
67. J. Dunklin, G.T. Forcherio, K. Berry, **D.K. Roper**. Asymmetric reduction of gold nanoparticles into thermoplasmonic polydimethylsiloxane thin films. *Proceedings of SPIE Optics + Photonics*, San Diego, CA. Aug. 17-21, 2014.
68. J. Dunklin, G.T. Forcherio, **D.K. Roper**. Geometric optics of gold nanoparticle-polydimethylsiloxane thin film systems. *Proceedings of SPIE Optics + Photonics*, San Diego, CA. Aug. 17-21, 2014.
69. **\*Roper, D.K.**, Ahn, W., Blake, P., Taylor, B., D'Asen, Y. Subwavelength ordered nanoparticle structures enhance sensing via electromagnetic coupling with localized surface plasmons. *Proc. 2009 NSF Eng. Res. Innov. Conf.* Honolulu, HI, June 22-25, 2009.
70. Lightfoot, E.N. and **D.K. Roper**, "What Can Simulated Moving Beds Do for the Chromatographer?", *Proceedings of PrepTech'94*, Secaucus, NJ, Mar. 22-24, 1994.
71. **Roper, D.K.**, Blake, P., DeJarnette, D., Electromagnetically active nanocomposite metamaterial sensors. The 7th International Workshop on Advanced Smart Materials and Smart Structures Technology. ANCRiSST2012. July 27-28, 2012, Bangalore, India.

**PEER-REVIEWED PUBLICATIONS:** Submitted, In Revision, or In Preparation

72. Forcherio, G.T., Benamara, M., **Roper, D.K.** Electron energy loss spectroscopy of hot electron transport between gold nanoantennas and molybdenum disulfide by plasmon excitation. Submitted.
73. Forcherio, G.T., DeJarnette, D., Benamara, M., **Roper, D.K.** Electron energy loss spectroscopy of surface plasmon resonances on aberrant gold nanostructures. Submitted.
74. Dunklin, J.R., Bodinger, C., Forcherio, G.T., **Roper, D.K.** Describing plasmonic extinction in optically dense, multi-scale gold nanoparticle-polymer films. Submitted.
75. Forcherio, G.T., Benamara, M., **Roper, D.K.** Plasmon excitation and damping in noble metal nanoparticle-MoS<sub>2</sub> nanocomposites. Submitted.
76. Dunklin, J.R., Forcherio, G.T., Berry, K.R., **Roper, D.K.** Interfacial reflection enhanced optical extinction and thermal dynamics in polymer nanocomposite films. Submitted.
77. French, R.T., Bejungan, V., Forcherio, G.T., Roper, D.K. Characterization of lattice resonances in a square array of gold nanoparticles in polydimethylsiloxane. In preparation

78. Bejugam, V., French, R., Forcherio, G.T., **Roper, D.K.** Reduction of Au(III) to Au(0) nanoparticles by wet chemical method. In preparation.
79. Taylor, B., Harben, B., and **D.K. Roper.** Exact solution to coupled dipole approximation of Maxwell's equations for periodic subwavelength nanostructures. In revision.
80. Beutler, M., Ahn, W. and **Roper, D.K.** Investigation of colloidal gold nanoparticle thermal stability for application in cyclic DNA amplification. In revision.
81. Medina, C. and **D.K. Roper.** Diatomaceous earth clarification of bacterial lysate. In revision.
82. Velasco, L., Proctor, J.C., and **D.K. Roper.** Effects of frustule geometry on characteristic optical properties of diatom algae. *J. Nanoscience and Nanotechnology.* In preparation
83. Russell, A.G., Schwarz, S., Berry, K., and **D.K. Roper.** Plasmonic pervaporation via laser-excited gold nanoparticle-functionalized membranes. *J. Phys Chem C.* In preparation.

### ON-LINE SIMULATION TOOLS

1. M. Seeram, G.T. Forcherio, and **D.K. Roper.** Shape Generator for the DDSCAT software. (2016) An intuitive GUI to generate arbitrary nanostructure-substrate-superstrate scenarios for simulation by DDSCAT. <https://nanohub.org/resources/22758>, DOI: 10.4231/D3J960B3D 2 users
2. M. Seeram, G.T. Forcherio, P. Blake, and **D.K. Roper.** Shape Generator for the Discrete Dipole Approximation. (2015) An intuitive GUI to generate arbitrary nanostructure-substrate-superstrate scenarios for simulation by DDSCAT. <https://nanohub.org/resources/22363>. 211 users.
3. Forcherio, G.T. and **D.K. Roper.** (2014) Geometric Optics Tool. Describes resonant optical interactions between two components of a simple photonic device. <https://nbphotonics.uark.edu/multimedia/tools/>.

### INTELLECTUAL PROPERTY

#### PATENTS

1. **Roper, D.K.**, Ahn, W., Taylor, B.J., Dall'Asen, A.G. Method of making nanoparticles by electroless plating. U.S. Patent 8,097,295. January 17, 2012.
2. **Roper, D.K.** Simultaneous amplification and detection of deoxyribonucleic acid by an optical method using surface plasmon resonance. U.S. Patent 7,998,672. August 16, 2011. E.P. Patent in progress.
3. Joyce, J.G., Cook, J.C., Abeygunawarda, C., Grimm, K.M., Przysiecki, C.T., Hepler, R.W., Ip, C.C., **Roper, D.K.**, Xu, Q.W., Jansen, K.U., Keller, P.M., Cope, L.D. High molecular weight intracellular adhesin antigen; induction immunology response. U.S. Patent 7,157,443. January 2, 2007.
4. Joyce, J.G., Cook, J.C., Abeygunawarda, C., Grimm, K.M., Przysiecki, C.T., Hepler, R.W., Ip, C.C., **Roper, D.K.**, Xu, Q.W., Jansen, K.U., Keller, P.M., Cope, L.D. Staphylococcus aureus exopolysaccharide and process. E.P. Patent 1,455,817. December 31, 2008.

#### PROVISIONAL U.S. PATENT APPLICATIONS

1. **Roper, D.K.;** Ahn, W. Direct, instantaneous measurement of energy flux and heat conversion in microvolume samples. U.S. Provisional Application. Reference number 0274-7999US.
2. **Roper, D. K.;** Ahn, W. "Increasing heat transduction via surface plasmon resonance by modulating resonant continuous-wave irradiation" U.S. Patent Application No. 12/525,391 filed on July, 2009.
3. **Roper, D.K.** Apparatus and methods for increasing lateral mass transfer over molecule sensors. U.S. Patent Pending. U.S. Provisional Application filed Dec. 30, 2005. Reference number 0275-7630US.
  - Converted to a U.S. Utility App. in Dec. 2006. Patent cooperation treaty (PCT) filed in Dec. 2006.
4. **Roper, D.K.;** Ahn, W.; Taylor, B.; Dall'Asen, Y. Tunable spectroscopic enhancement via transforming electroless plating into metal films with predictable optical features. U.S. Provisional Application. Reference number U-4377 (083404-0139).

- Converted to a U.S. Utility App. in Feb. 2008.

#### PUBLISHED U.S. PATENT APPLICATIONS

1. **Roper, D.K.** Direct measurement of sorption on 3-D surfaces such as resins, membranes or other preformed materials using lateral dispersion to estimate rapid sorption kinetics or high binding capacities. U.S. Patent Pending. U.S. Patent Application 2005271141. Filed Nov. 9, 2004.
  - Converted to a U.S. Utility App. in Nov. 2005.

#### CONFIDENTIAL INVENTION DISCLOSURES

1. Roper, D.K. Jan 11, 2008. Tunable spectroscopic enhancement via transforming electroless plating into metal films with predictable optical features Univ of Utah Confidential Invention Disclosure
2. Roper, D.K. May 21, 2007. Cancer treatment combining hyperthermia and photodynamic therapy using novel devices. University of Utah Confidential Invention Disclosure.
3. Roper, D.K. and Ahn, W. July 28, 2006. Instantaneous measurement of heat conversion and energy flux in microvolume samples. University of Utah Confidential Invention Disclosure.
4. Roper, D.K. and Ahn, W. July 11, 2006. Increasing heat transduction via surface plasmon resonance by modulating resonant continuous-wave irradiation. University of Utah Confidential Invention Disclosure.
5. Roper, D.K. March 7, 2006. Plasmonic induction of thermal cycling and molecular reaction with simultaneous plasmonic detection of temperature, pressure and product concentration using optical waveguides. University of Utah Confidential Invention Disclosure.
6. Roper, D.K. Feb 1, 2005. Simultaneous Amplification and 3-D Detection of Deoxyribonucleic acid by an Optical Method. University of Utah Confidential Invention Disclosure.
7. Roper, D.K. Aug 20, 2004. Data Analysis for *in situ* Measures of Adsorption on 3-D Surfaces. University of Utah Confidential Invention Disclosure.
8. Roper, D.K. Aug 5, 2004. Apparatus and methods for increasing lateral mass transfer over molecule sensors. University of Utah Confidential Invention Disclosure.
9. Roper, D.K. Aug 5, 2004. Dispersion-Enhanced Lateral Mass Transport for *in situ* Measures of Surface Adsorption. University of Utah Confidential Invention Disclosure.
10. Roper, D.K. Aug 3, 2004. Direct, Dynamic Measurement of Adsorption on Adsorbents or Membranes *in situ*. University of Utah Confidential Invention Disclosure.

#### ENTREPRENEURIAL AWARDS

1. Ivey Business Plan Competition. Ontario, Canada, Jan.28, 2012. Learning DifferentiaED. Barry James (D.K. Roper, Graduate Advisor; Carol Reeves, Business Mentor). \$20,000.00
2. 2012 Donald W. Reynolds Governor's Cup – 3<sup>rd</sup> Place: Learning DifferentiaED. Barry James (D.K. Roper, Graduate Advisor; Carol Reeves, Business Mentor)

#### CONFERENCE ABSTRACTS

1. M. El-Shenawee, P. Blake, A. M. Hassan and **D.K. Roper**. Surface plasmons of finite nanoring arrays. IEEE AP-S and USNC/URSI Nat. Radio Sci Mtg. Spokane, WA, July 3-8, 2011.
2. **D.K. Roper**, W. Ahn, P. Blake, B. Harbin, and G. Jang. Tuning plasmon-coupled radiation in nanolattices to semiconductor bandgaps. 239<sup>th</sup> ACS Nat'l Mtg, San Francisco, CA, Mar 21-25, (2010).
3. W. Ahn and **D.K. Roper**. Fabrication of regular arrays of gold nanospheres by thermal transformation of electroless-plated films. 239<sup>th</sup> ACS Nat'l Mtg, San Francisco, CA, Mar 21-25, (2010).
4. **D.K. Roper**, A. Russell, J. Pestel, M. McKnight, and A. Sharp. Thermopto-plasmonic gold nanostructures enhance fuel cell catalysis. 239<sup>th</sup> ACS Nat'l Mtg, San Francisco, CA, Mar 21-25, (2010).

5. P. Blake, W. Ahn, and **D.K. Roper**. Enhanced uniformity in arrays of electroless plated spherical gold nanoparticles using tin presensitization. *239<sup>th</sup> ACS Nat'l Mtg*, San Francisco, CA, Mar 21-25, (2010).
6. **D.K. Roper**, P. Blake, W. Ahn, B. Harbin, G. Jang, and B. Taylor. Subwavelength nanoparticle ordered structures for bio, micro, & spectral anal. *237<sup>th</sup> ACS Nat'l Mtg*, Washington, D.C., Aug 16-20, (2009).
7. **D.K. Roper**, P. Blake, W. Ahn, B. Taylor, A.G. Russell, and G. Jang. Radiative photon-plasmon coupling for enhanced energy conversion. *237<sup>th</sup> ACS Nat'l Mtg*, Washington, D.C., Aug 16-20, (2009).
8. W. Ahn and **D.K. Roper**, Fabrication of periodic Au NP assemblies using electroless gold plating combined with nanosphere lithography, *237<sup>th</sup> ACS Nat'l Mtg*, Salt Lake City, UT. Mar 22-26, (2009).
9. **D.K. Roper**, W. Ahn, P. Blake, B. Taylor, and A. Russell. Photothermal photonplasmon excitation to enhance energy conversion, *237<sup>th</sup> ACS Nat'l Mtg*, Salt Lake City, UT. Mar 22-26, (2009).
10. **D.K. Roper**, W. Ahn, P. Blake, B. Taylor and A. Dall'Asen. Subwavelength NP ordered structures for enhanced sensing. *237<sup>th</sup> ACS Nat'l Mtg*, Salt Lake City, UT. Mar 22-26, (2009).
11. **D.K. Roper**, W. Ahn, P. Blake, and B. Taylor. Extraordinary plasmon coupling in Au NP arrays for enhanced second harmonic generation. *237<sup>th</sup> ACS Nat'l Mtg*, Salt Lake City, UT. Mar 22-26, (2009).
12. W. Ahn and **D.K. Roper**. Transformed gold island film improves light-to-heat transduction of nanoparticles on silicon capillaries. *236<sup>th</sup> ACS Nat'l Mtg*, Philadelphia, PA. Aug 17-21, (2008).
13. Hoepfner, M., and **Roper, D.K.** Nonlinear analysis of resonant photon-plasmon thermal effects in nanoparticle suspensions. *Proceedings of AIChE Annual Meeting, 2007*.
14. Yu, J., **Roper, D.K.** Comparison of chemical etching variations for tapered optical fibers. *Proceedings of AIChE Annual Meeting, 2007*
15. **Roper, D.K.** and Beutler, M. Surface Co-localization of gold nanoparticles and oligonucleotides: a novel approach to biosensing. Univ of Utah Undergrad Research Abstracts (2007) 77.
16. Lightfoot, E.N., **Roper, D.K.**, Moscariello, J.S. How can you tell if a column is doing its job? Abstr. Pap Am Chem Soc 225:64-BIOT. 2003.
17. Joyce, Joseph G.; Abeygunawardana, C.; Xu, Qiuwei; Cook, James C.; Hepler, Robert; Przysiecki, Craig T.; Grimm, Karen M.; **Roper, Keith**; et al., Isolation, structural characterization, and immunological evaluation of a high molecular weight exopolysaccharide from *Staphylococcus aureus*. Abstracts of Papers, 226th ACS National Meeting, New York, NY, United States, September 7-11 (2003).

#### MAJOR MEDIA EXPOSURE (44 in published venues to date)

- D.K. Roper and G. Forcherio invited to submit cover art to *Adv. Opt. Mater.* May 2016.
- Arkansas Newswire Headline. "Roper appointed leader of engineering program, network at NSF" Oct 9, 2014. <http://newswire.uark.edu/articles/25478/>
- SPIE Newroom: "Biological sensing with metamaterials." Sept. 30, 2014. <http://spie.org/x110281.xml>
- NSF Media Advisory. "Learn the latest on synthetic biology at a June 26 Capitol Hill briefing" June 23, 2014. [http://www.nsf.gov/news/news\\_summ.jsp?cntn\\_id=131810&org=NSF&from=news](http://www.nsf.gov/news/news_summ.jsp?cntn_id=131810&org=NSF&from=news)
- Arkansas Newswire Headline. "NSF Awards Graduate Research Fellowships to a Dozen U of A Students" May 16, 2014. <http://newswire.uark.edu/articles/24348/>
- Arkansas Newswire Headline. "Chemical Engineering Professor Inducted into Medical and Biological Engineering Elite" May 1, 2014. <http://newswire.uark.edu/articles/24225/>
- National Science Foundation: WeeklyWire News Detail Apr 29, 2014. "Meet Keith Roper on the Flip Side!" [https://inside2.nsf.gov/news\\_attachments/131266/atcmt/TheFlipSide\\_KeithRoper.pdf](https://inside2.nsf.gov/news_attachments/131266/atcmt/TheFlipSide_KeithRoper.pdf)



- Congressional Quarterly (CQ) Researcher, Vol 24, No. 16 pp 361-384. Apr 25, 2014 “Synthetic Biology: Should scientists try to create new life forms?” [www.cqresearcher.com](http://www.cqresearcher.com)
- International Connections Academy “Nanotechnology”. Online chat room Forum. Apr 28, 2014. <http://www.internationalconnectionsacademy.com/private-school/home.aspx>
- ERC Association website: “ERC Program Director Keith Roper Named AIMBE Fellow”. Mar. 31, 2014: <http://erc-assoc.org/>
- AIMBE Fellowbook: “Keith Roper, Ph.D. AIMBE College of Fellows Class of 2014. Mar. 31, 2014. <http://aimbe.org/college-of-fellows/cof-1696/>
- University of Arkansas Newswire. “MicroEP Student Recognized by the Department of Energy”. July 5, 2013. <http://newswire.uark.edu/articles/21471/microep-student-recognized-by-the-department-of-energy>
- National Science Foundation Discoveries. “A Student’s Road to Research”. Nov 13, 2012 [http://www.nsf.gov/discoveries/disc\\_summ.jsp?cntn\\_id=126039&org=NSF](http://www.nsf.gov/discoveries/disc_summ.jsp?cntn_id=126039&org=NSF)
- Arkansas College of Engineering Blog. “Chemical Engineering in Mexico” June 28, 2012 <http://engrblog.uark.edu/2012/06/28/chemical-engineering-in-mexico/>
- Arkansas Engineer (Spring 2012 edition): “Inspired by Nature”. <http://arkansasengineer.uark.edu/2012/03/19/inspired-by-nature/>
- Center of Innovation for Nanotechnology. “Gold on silica nanofilm – Electronics can never be too efficient” Mar. 14, 2012 <http://www.nanobiotech-blog.org/2012/03/gold-on-silica-nanofilm-electronics-can-never-be-too-efficient.html>
- Arkansas Newswire Headline. “Researchers discover new method of making nanoparticles” Mar. 6, 2012. <http://newswire.uark.edu/article.aspx?id=17879>
- The City Wire. “New nanoparticle method developed at UA.” Mar. 6, 2012. <http://www.thecitywire.com/node/20691>
- ScienceFreaks. “Important advance in nanotechnology: New method of making nanoparticles discovered” Mar. 6, 2012. <http://sciencefreaks.co.uk/2012/03/06/new-method-of-making-nanoparticles-discovered/>
- R&D Mag. “Researchers discover new method of making nanoparticles” Mar. 6, 2012. <http://rdmag.com/News/2012/03/Manufacturing-Nanotechnology-Researchers-Discover-New-Method-Of-Making-Nanoparticles/>
- PhysOrg.com. “Researchers discover new method of making nanoparticles” Mar. 6, 2012. <http://www.physorg.com/news/2012-03-method-nanoparticles.html>
- Newswise Inc. “Researchers discover new method of making nanoparticles” Mar. 6, 2012 <http://www.newswise.com/articles/view/586468?print-article>
- News Blaze. “Researchers discover new method of making nanoparticles” Mar. 6, 2012 <http://newsblaze.com/story/2012030605430700002.wi/topstory.html>
- Nano Werk. “Researchers discover new method of making nanoparticles” Mar 6, 2012 <http://www.nanowerk.com/news/newsid=24483.php>
- Lab Manager Magazine. “Researchers discover new method of making nanoparticles” Mar 6, 2012 <http://www.labmanager.com/?articles.view/articleNo/7099/article/Rese>
- Innovations Report. “Researchers discover new method of making nanoparticles” Mar 7, 2012 [http://www.innovations-report.de/html/berichte/biowissenschaften\\_che](http://www.innovations-report.de/html/berichte/biowissenschaften_che)
- e! Science News. “Researchers discover new method of making nanoparticles” Mar 7, 2012 <http://www.cisionpoint.com/Detail/NewsItem.cp/4062605330>
- Delfi. “Avastati elektroonika nanoosakeste uus valmistamismeetod” Mar 6, 2012 <http://forte.delfi.ee/archive/print.php?id=64042151>
- Arkansas Newswire Headline. “Winners Announced for From Abstract to Contract: Graduate Student Research Competition” Feb. 28, 2012. <http://newswire.uark.edu/article.aspx?id=17812>
- National Engineers Week. New Faces of Engineering College Edition. Jan 2, 2012. American Indian Science and Engineering Society. Joe Wyatt: work on microfluidic devices. <http://www.facebook.com/CollegeEdition>, accessed Jan 13, 2012



- Zee News. “Nanoparticles make DNA 1000 times faster.” Oct 9, 2011 [http://zeenews.india.com/news/health/health-news/nanoparticles-make-dna-analysis-1-000-times-faster\\_14107.html](http://zeenews.india.com/news/health/health-news/nanoparticles-make-dna-analysis-1-000-times-faster_14107.html)
- Meridian Institute. “New patent improves speed of DNA analysis.” Oct 5, 2011 [http://www.merid.org/en/Content/News\\_Services/Nanotechnology\\_and\\_Development\\_News/Articles/2011/Oct/05/DNA.aspx](http://www.merid.org/en/Content/News_Services/Nanotechnology_and_Development_News/Articles/2011/Oct/05/DNA.aspx)
- Next Big Future. “New patent improves speed of DNA analysis. Researcher uses nanoparticles to make DNA Analysis 1000 times faster.” Oct 3, 2011 <http://nextbigfuture.com/2011/10/new-patent-improves-speed-of-dna.html>
- Arkansas Newswire Headline. “New patent improves speed of DNA analysis” Sept. 28, 2011. <http://newswire.uark.edu/article.aspx?id=16865>
- Nanoscale Material Science and Engineering Building Dedication. Research Profile. Sept 16, 2011.
- Arkansas. “From the Sun to the Grid”. Summer 2011 60(4) 28-31.
- Arkansas Newswire Headline. “Roper published textbook for separations in pharmaceuticals, biofuels, and alternative energy” Nov. 16, 2010. <http://newswire.uark.edu/article.aspx?id=15050>
- National Science Foundation Press Release 10-180. NSF Research Dollars Boost Science and Engineering Infrastructure in Regions in Need of Support. Arkansas Center for Generating Renewable Energy with Efficient Nanoplasmonic Solar Cells [http://www.nsf.gov/news/news\\_summ.jsp?cntn\\_id=117384](http://www.nsf.gov/news/news_summ.jsp?cntn_id=117384).
- KCPW News. U Wins \$2M Grant from NSF. Goal: 180 More Engineering Grads Annually. <http://www.kcpw.org/article/4206>. Interview with Cynthia Furse, PI. Aug 21, 2007.
- Environmental Protection Agency. Estella Waldman, Communications Director for the National Center for Environmental Research is writing an EPA P3 web page article about students in Ch En 4975. (2007)
- University of Utah’s alumni magazine highlighted AMES students participating with the U: Swenson, P. “Young Doctors, Scientists and Engineers in Love with Learning”, *Continuum*, 14(4) 24-29, Spring 2005
- Deseret Morning News reporter Susan Whitney prepared an education feature for April 26, 2005. Whitney, S., *Deseret Morning News*, April 22, 2005.
- Storey, K. “Tomorrow’s scientists partner on sustainable hydrogen project” *Energy Services Bulletin* 24(4) August 2005. <http://www.wapa.gov/es/pubs/esb/2005/august/aug058.htm>
- Lee Siegel published a media release about the hydrogen sustainability project: Siegel, L. “Students in EPA contest in DC: U and High School Scholars Design Hydrogen Power Device”. Spring 2005

#### **CONFERENCE PRESENTATIONS** (112 conference presentations listed + 65 invited lectures)

1. D.K. Roper, G.T. Forcherio, and D. DeJarnette. Structure-function relations for carrier interactions with confined field modes on two-dimensional materials. AIChE Annual Meeting Salt Lake City, UT, Nov. 9 (2015).
2. D.K. Roper, J. Dunklin, K. Berry, G.T. Forcherio, and P. Blake. Enhanced optical and thermal dynamics in polymer nanostructure films. AIChE Annual Meeting. Salt Lake City, UT, Nov. 10 (2015).
3. D.K. Roper. Engineered systems for entrepreneurs in academia and industry. AIChE Annual Meeting. Salt Lake City, UT, Nov. 10 (2015).
4. M. Seeram, G.T. Forcherio, P. Blake, D.K. Roper. Accelerating optical efficiency calculations of nanoparticles with software. AIChE Mid-America Regional Conference. Lawrence, KS, Apr. 4 (2015).

5. *2<sup>nd</sup> Annual nanoHUB User Conference*, West Lafayette, IN. Aug 31-Sept 4, 2015. Accelerating optical efficiency calculations of nanoparticles using shape generator for the discrete dipole approximation. M. Seeram, G.T. Forcherio, P. Blake, D.K. Roper
6. *Surface Plasmon Photonics 7<sup>th</sup> International Conference*, Jerusalem, Israel, May 31-June 5, 2015. Probing morphological alteration of carrier interaction with confined field modes on two-dimensional materials. D.K. Roper, G.T. Forcherio, D. DeJarnette, M. Benamara
7. *Materials Research Society*, San Francisco, CA. Apr. 6-10, 2015. Plasmon optics and thermal dissipation in nanocomposite thin films. J.R. Dunklin, G.T. Forcherio, K.R. Berry Jr., and D.K. Roper.
8. *Near Field Optics-13*, Snowbird, UT. Aug 31- Sep 4, 2014: Electron optics of composite metamaterials. D.K. Roper
9. *AIChE Annual Meeting*, Atlanta, GA. Nov 16-21, 2014: Peptoid-modified bicelles as surrogate cell membranes for membrane protein sensors and analytics. H. Najafi, D. DeJarnette, D.K. Roper, S.L. Servoss
10. *SPIE Optics + Photonics*, San Diego, CA. Aug. 17-21, 2014: Diatom frustule photonic crystal geometric and optical characterization. J. Mishler, P. Blake, A.J. Alverson, D.K. Roper, J. B. Herzog
11. *SPIE Optics + Photonics*, San Diego, CA. Aug. 17-21, 2014: Polarizability extraction for rapid computation of Fano resonance in nanoring lattices. G.T. Forcherio, D. DeJarnette, P. Blake, D.K. Roper
12. *SPIE Optics + Photonics*, San Diego, CA. Aug. 17-21, 2014: Optical attenuation of plasmonic Au-PDMS nanocomposite thin-film devices. G.T. Forcherio, D.K. Roper
13. *SPIE Optics + Photonics*, San Diego, CA. Aug. 17-21, 2014: Asymmetric reduction of gold nanoparticles into thermoplasmonic polydimethylsiloxane thin films. J. Dunklin, G.T. Forcherio, K. Berry, D.K. Roper
14. *SPIE Optics + Photonics*, San Diego, CA. Aug. 17-21, 2014: Geometric optics of gold nanoparticle-polydimethylsiloxane thin film systems. J. Dunklin, G.T. Forcherio, D.K. Roper
15. *248<sup>th</sup> ACS National Meeting*, San Francisco, CA. Aug 10-14, 2014: Hollow nanocages dispersion and its photothermal properties. M. Lisunova, J. Norman, X. Wei, S. Jenkins, J. Chen, D.K. Roper
16. *22<sup>nd</sup> ASGC Annual Symposium*, Hot Springs, AR. Apr. 7, 2014: Plasmonic pervaporation for wastewater recycling. J. Dunklin, D.K. Roper
17. *International Conference on Surface Plasmon Photonics*, Ottawa, Canada. May 26-31, 2013: Fano resonance from constructive interference of scattered light in square plasmonic nanoparticle arrays tunable for wavelength specific application. D. DeJarnette, J. Norman, D.K. Roper
18. *AIChE Annual Meeting*, Pittsburgh, PA. Oct 28-Nov 2, 2012: Electromagnetically active nanocomposite metamaterial biosensors. D.K. Roper, D. DeJarnette, G.-G. Jang, A. Russell, P. Blake, K. Berry
19. *AIChE Annual Meeting*, Pittsburgh, PA. Oct 28-Nov 2, 2012: Electron optics of self-assembled nanocomposite metamaterials. D.K. Roper, P. Blake, D. DeJarnette
20. *Microelectronics/Photonics Industrial Advisory Council*. Fayetteville, AR, Nov 5-6, 2012. Controlling the Fano resonance in plasmonic nanoparticle arrays. D. DeJarnette, J. Norman, D.K. Roper
21. *ABI Fall Research Symposium*. Fayetteville, AR, Oct. 23, 2012. Scaleable Production of Conjugated Linoleic-Rich Soybean Oil. X. Wei, K. Almutairi, U. Shah, D.K. Roper, and A. Proctor
22. *ANCRISST 2012. 7th International Workshop on Advanced Smart Materials*. Bangalore, India July 27-28, 2012: EM active nanocomposite metamaterial sensors. D.K. Roper, P. Blake, D. DeJarnette.
23. *NSF CMMI Engineering Research and Innovation Conference*, Boston, MA. Jul 9-11, 2012: Refractive index chemical sensing with ordered nanoparticle arrays. P. Blake and D.K. Roper
24. *4<sup>th</sup> Annual FEP Honors Research Symposium*, Fayetteville, AR. Apr 24, 2012: Gold NP arrays to analyze genetic disease biomarkers and improve solar cells. W. F. Lea, M.E. West, D.K. Roper

25. *4<sup>th</sup> Annual FEP Honors Research Symposium*, Fayetteville, AR. Apr 24, 2012: Gold NP array applications in biomarker analysis and solar technology. W. F. Lea, M.E. West, D.K. Roper
26. *2012 Univ of Arkansas Graduate Education Week*, Fayetteville, AR. Feb 6-10, 2012: Refractive index chemical sensing with ordered nanoparticle arrays. P. Blake and D.K. Roper
27. *2012 Univ of Arkansas Graduate Education Week*, Fayetteville, AR. Feb 6-10, 2012: Prediction of plasmon heating in open, Au NP plated Si capillaries. A. Russell, M. McKnight, J. Hestekin, D.K. Roper
28. *2012 Univ of Arkansas Graduate Education Week*, Fayetteville, AR. Feb 6-10, 2012: Characterizing spatiotemporal dependence of electroless metal thin film. G.-G. Jang and D.K. Roper
29. *AICHE Annual Meeting*, Minneapolis, MN. Oct 16-21, 2011: Plasmon enhanced nanoscale metamaterial sensors. D.K. Roper, P. Blake, G.-G. Jang, B. Harbin
30. *AICHE Annual Meeting*, Minneapolis, MN. Oct 16-21, 2011: Geometric effects on far-field coupling between multipoles of nanoparticles in square arrays. D. Dejarnette and D.K. Roper
31. *2011 Arkansas NSF EPSCoR Annual Meeting*, Heber Springs, AR. July 28-28, 2011. Plasmon active nanostructures for advanced solar photovoltaics. D.K. Roper
32. *2011 George Washington Carver Research*, Fayetteville, AR. July 8, 2011. Cost effective fabrication of cm-scale ordered Au NP array by thermal nanoimprint lithography. M. Wagner and D.K. Roper
33. *Cell and Molecular Biology NSF REU Program*, Fayetteville, AR. July 8, 2011. Plasmon enhanced pervaporation from polydimethylsiloxane (PDMS) decorated with gold nanoparticles. D.K. Roper and C. Carter
34. *ACS National Meeting*, Anaheim, CA. Mar. 27-31, 2011: Enhanced nanoparticle response based on dipole coupling in plasmonic sensors. P. Blake, B. Harbin, J. Obermann, D.K. Roper
35. *ACS National Meeting*, Anaheim, CA. Mar. 27-31, 2011: Scalable prediction of plasmon heating in open, gold nanoparticle plated silica capillaries filled with aqueous and organic fluids. A. Russell, M. McKnight, J. Hestekin, and D.K. Roper
36. *ACS National Meeting*, Anaheim, CA. Mar. 27-31, 2011: Balancing redox activity allows spectrophotometric detection of Au(I) using tetramethylbenzidine dihydrochloride. G. Jang and D.K. Roper
37. *AICHE Annual Meeting*, Salt Lake City, UT. Nov. 7-12, 2010: "Ordered nanoarchitectures improve plasmon enhancement near semiconductor bandgaps in the near-IR", D.K. Roper, W. Ahn, P. Blake, B. Harbin, A. Russell, and G. Yang
38. *ISSSR 2010*, Springfield, MO. Jun 21-24, 2010: "Plasmon enhanced nanostructures: metamaterials in virus sensing and DNA analysis", D.K. Roper and W. Ahn
39. *ACS National Meeting*, San Francisco, CA. Mar. 22-26, 2010: "Tuning plasmon-coupled radiation in nanolattices to semiconductor bandgaps in the near-IR", D.K. Roper, P. Blake, W. Ahn, B. Harben.
40. *ACS National Meeting*, San Francisco, CA. Mar. 22-26, 2010: "Enhanced uniformity of electroless plated arrays of spherical Au nanoparticles using tin pre-sensitization", P. Blake, W. Ahn, D.K. Roper.
41. *ACS National Meeting*, San Francisco, CA. Mar. 22-26, 2010: "Fabrication of regular arrays of gold nanospheres by thermal transformation of EL-plated films", W. Ahn, P. Blake, D.K. Roper.
42. *ACS National Meeting*, San Francisco, CA. Mar. 22-26, 2010: "Thermopto-plasmonic gold nanostructures enhance fuel cell catalysis", A. Russell, G. Jang, P. Blake, D.K. Roper.
43. *Nanotechnology in Healthcare*, Morrilton, AR. Jan. 6-9, 2010: "Plasmon-enhanced nanostructures in virus sensing, DNA analysis, and optothermal cancer therapy", D.K. Roper.
44. *AICHE Annual Meeting*, Nashville, TN. Nov. 8-13, 2009: "Laser-Induced Plasmon Excitation in Gold Nanoparticles to Evaporate Water and Increase Hydrogen Fuel Cell Efficiency", A. Russell, M. McKnight, A. Sharp, and D.K. Roper.
45. *AICHE Annual Meeting*, Nashville, TN. Nov. 8-13, 2009: "Formation of Spherical Nanoparticle Arrays Via Electron-Beam Lithography", P. Blake, W. Ahn, and D.K. Roper.

46. *AIChE Annual Meeting*, Nashville, TN. Nov. 8-13, 2009: "Study of Macroscopic Uniformity and Scale-ability of Continuous Flow Electroless Plated Au Film", G. Jang and D.K. Roper.
47. *AIChE Annual Meeting*, Nashville, TN. Nov. 8-13, 2009: "Gold Island Film Patterning Via Selective Electroless Plating", W. Ahn and D.K. Roper
48. *Materials Research Society Research Symposium* Univ of Arkansas Chapter, Fayetteville, AR. Nov. 2009. Gold Island Film Patterning Via Selective Electroless Plating", W. Ahn and D.K. Roper
49. *ACS National Meeting*, Washington, DC. Aug. 16-20, 2009: "Subwavelength nanoparticle ordered structures for bio, micro, & spectral anal", D.K. Roper, P. Blake, W. Ahn, B. Harben, G. Jang, and B. Taylor.
50. *ACS National Meeting*, Washington, DC. Aug. 16-20, 2009: "Radiative photon-plasmon coupling for enhanced energy conversion.", D.K. Roper, P. Blake, W. Ahn, B. Taylor, A.G. Russell, and G. Jang.
51. *ACS National Meeting*, Salt Lake City, UT. Mar 22-26, 2009: "Fabrication of periodic Au NP assemblies using electroless gold plating combined with nanosphere lithography", W. Ahn and D.K. Roper
52. *ACS National Meeting*, Salt Lake City, UT. Mar 22-26, 2009: "Photothermal photonplasmon excitation to enhance energy conversion", D.K. Roper, W. Ahn, P. Blake, B. Taylor, and A. Russell.
53. *ACS National Meeting*, Salt Lake City, UT. Mar 22-26, 2009: "Subwavelength NP ordered structures for enhanced sensing", D.K. Roper, W. Ahn, P. Blake, B. Taylor and A. Dall'Asen.
54. *ACS National Meeting*, Salt Lake City, UT. Mar 22-26, 2009: "Extraordinary plasmon coupling in Au NP arrays for enhanced second harmonic generation", D.K. Roper, W. Ahn, P. Blake, and B. Taylor.
55. *NSF EPSCoR Annual Conference* Little Rock, AR. Oct 5-7, 2008: "Surface Plasmons in Nanoparticle Arrays." D.K. Roper
56. *NanoUtah* Salt Lake City, UT. Oct 16-17, 2008: "Comparative SERS activity of Rhodamine 6G absorbed on different nanoparticle substrates", A.G. Dall'Asen and D.K. Roper
57. *ACS National Meeting*, Philadelphia, PA. Aug 17-21, 2008: "Transformed gold island film improves light-to-heat transduction of nanoparticles on silicon capillaries", W. Ahn and D.K. Roper
58. *ISSSR 2008*, Hoboken, NJ. Jun 23-27, 2008: "Optoplasmonic gold nanoparticle assembly for sensing, spectroscopy and heat transfer", D.K. Roper, B. Taylor, W. Ahn, and Y. Dall'Asen
59. *ISSSR 2008*, Hoboken, NJ. Jun 23-27, 2008: "Improving dynamic range and modeling 3-D adsorption in sensors", D.K. Roper
60. *AIChE Annual Meeting*, Salt Lake City, UT. Nov 4-9, 2007: "Describing Temperature Increases in Plasmon-Resonant Nanoparticle Systems", M.P. Hoepfner and D.K. Roper
61. *AIChE Annual Meeting*, San Fransisco, CA. Nov 4-9, 2007: "Parameters Affecting Single Mode Tapered Optical Fiber Cone Angle and Tip Size and Application of Evanescent Coupling", Y. Yu and D.K. Roper
62. *AIChE Annual Meeting*, San Fransisco, CA. Nov 4-9, 2007: "High-Energy Impingement Mixing Improves Recovery And Purity Of Sodium Phytochlorin", N. Kamerath, P. Blake and D.K. Roper
63. *AIChE Annual Meeting*, San Fransisco, CA. Nov 4-9, 2007: "Spectroscopic Characterization Of Plasmon Capillaries Coated With Gold By Electroless Plating", W. Ahn and D.K. Roper
64. *AIChE Annual Meeting*, San Fransisco, CA. Nov 4-9, 2007: "Optimizing Filtration Of Phytochlorin Compounds", P. Blake, N. Kamerath and D.K. Roper
65. *NanoUtah* Salt Lake City, UT. Oct 2007: "Resonant optical properties of electroless gold island films", W. Ahn and D.K. Roper
66. *AIChE Annual Meeting*, San Fransisco, CA. Nov 12-16, 2006: "Nanoscale thermal dissipation and heat transport by laser induction of localized SPR in gold nanoparticles", W. Ahn and D.K. Roper
67. *AIChE Annual Meeting*, San Fransisco, CA. Nov 12-16, 2006: "Mass transport in analysis of polynucleotides by localized SPR in gold nanoparticles on optical fibers", Y. Yu, W. Ahn and D.K. Roper

68. *University of Utah Undergraduate Research Symposium*. Salt Lake City, UT. April 3, 2006: "Transduction of light energy to heat by SPR", D.K. Roper, H. Ma, M. Hoepfner, W. Ahn
69. *University of Utah Undergraduate Research Symposium*. Salt Lake City, UT. April 3, 2006: "Developing a vacuum cell for transducing light to heat", D.K. Roper, H. Ma, M. Hoepfner, W. Ahn
70. *Twelfth Annual Student Research Symposium for the National Consortium for Specialized Secondary Schools of Mathematics, Science and Technology (NCSSMST)*. Philadelphia, PA, June 2-4, 2005: "Photovoltaic Hydrogen Production Prototype", D. Archer, E. Dishong and D.K. Roper
71. *E.P.A. Student Design Competition for Sustainability*. Washington, D.C. May 16-17, 2005: "Photoelectrochemical Hydrogen Production Prototype", D.K. Roper, E. Trujillo, A. Church, M. Welch
72. *Posters on the Hill*, Salt Lake City, UT. January, 20, 2005: "Photovoltaic Hydrogen Production Prototype", K. Stowers, T. Sudweeks, and D.K. Roper
73. *University of Utah Chemical Engineering Undergraduate Seminar*. Salt Lake City, UT, Apr 19, 2005: "Photovoltaic Hydrogen Production Prototype", T. Sudweeks and D.K. Roper
74. *University of Utah Undergraduate Research Symposium*. Salt Lake City, UT, Apr 7, 2005: "Photovoltaic Hydrogen Production Prototype: A Service Learning Seminar", J. Ambrosek, T. Sudweeks, D.K. Roper
75. *University of Utah Undergraduate Research Abstracts*. UROP: Salt Lake City, UT, Spring 2005: "Photovoltaic Hydrogen Production Prototype", T. Sudweeks, K. Stowers and D.K. Roper
76. *AICHE Annual Meeting*, Austin TX. Nov 8-12, 2004: "Adenovirus binding measured by surface plasmon resonance", D.K. Roper
77. *PREP 2004*, Baltimore, MD, May 24-26, 2004: "Adenovirus Binding, Elution and Equilibrium Measured by Surface Plasmon Resonance", D.K. Roper and G. Purdom
78. *A.I.Ch.E. Rocky Mountain Regional Student Meeting*, Tucson, AZ, Apr 4-6, 2003: "Hemin Inhibition of *S. aureus* in Microplate Assays," J. Mayne, A. Vance, D.K. Roper
79. *A.I.Ch.E. Rocky Mountain Regional Student Conference*, Tucson, AZ, Apr 4-6, 2003: "Diatomaceous Earth Clarification of Bacterial Lysate", C. Medina and D.K. Roper
80. *17<sup>th</sup> National Conference on Undergraduate Research*, Salt Lake City, UT, Mar 13-15, 2003: "Characterization of HEK 293 Cells and Adenovirus 5 Vectors for Gene Therapy by Light Microscopy and UV Spectrophotometry," A. Klinker, A. Vance and D.K. Roper
81. *17<sup>th</sup> National Conference on Undergraduate Research*, Salt Lake City, UT, Mar 13-15, 2003: "Adsorptive Purification of Adenovirus for Gene Therapy," N. Bandolin and D.K. Roper
82. *17<sup>th</sup> National Conference on Undergraduate Research*, Salt Lake City, UT, Mar 13-15, 2003: "Hemin Inhibition of *Staphylococcus aureus* in Microplate Assays," J. Mayne and D.K. Roper
83. *17<sup>th</sup> National Conference on Undergraduate Research*, Salt Lake City, UT, Mar 13-15, 2003: "Diatomaceous Earth Clarification of Bacterial Lysate", C. Medina and D.K. Roper
84. *Posters On The Hill*, Salt Lake City, UT, Jan 23, 2003: "Gene Therapy By Preparing Adenovirus Vectors" A. Vance, J. Mayne, A. Klinker and D.K. Roper
85. *University of Utah Undergraduate Research Abstracts 3* (2003) 11: "Greens Function Analysis of Dispersion in Membranes", Bandolin, N., and Roper, D.K.,
86. *University of Utah Undergraduate Research Abstracts* (2003): "Statistical Factorial Design Analysis for Optimal Cell Culture Growth", Hui, J., and Roper, D.K.
87. *A.I.Ch.E. Annual Meeting*, Indianapolis IN, Nov 4-8, 2002: "Factorial Analysis of Haemin-induced *S. aureus* Variants in Microreactors," D.K. Roper, J. Mayne and A. Vance
88. *A.I.Ch.E. Annual Meeting*, Indianapolis IN, Nov 4-8, 2002: "Using Green's Functions to Analyze Dispersion in Fixed Beds of Porous Media," D.K. Roper
89. *A.I.Ch.E. Annual Meeting*, Indianapolis IN, Nov 4-8, 2002: "Preparing Ad5 Vectors for Gene Therapy by Adsorptive Membranes," D.K. Roper, A Vance, J. Mayne, A Klinker, S. Pandita and N. Bandolin
90. *A.I.Ch.E. Annual Meeting*, Indianapolis IN, Nov 4-8, 2002: "Diatomaceous Earth Clarification of Bacterial Lysate," D.K. Roper and C. Medina

91. *Univ Utah College of Eng Nat Advisory Council*, Salt Lake City, UT, Nov 15, 2002: "Engineering Prevention of Infectious Diseases and Treatment of Gene Defects," D.K. Roper
92. *Morinda, Inc. Health & Technical Advisory Board*, Palm Springs, CA, Aug 16, 2002: "Antimicrobial and Sporicidal Activity of Natural Products against *Bacillus* and *Staphylococcus*," D.K. Roper
93. *Engineering Day*, Salt Lake City, UT, Aug 31, 2002: "Hypochlorite as an Antimicrobial and Sporicidal Against *Bacillus*," A. Vance and D. K Roper
94. *Engineering Day*, Salt Lake City, UT, Aug 31, 2002: "Hemin Inhibition of *S. aureus* in a 96-well Plate Culture Assay," A. Vance and D. K Roper
95. *First International Conference on Membrane and Filtration Technology in Biopurification*, Cambridge, U.K. Apr. 7-9, 1999: "Membrane Filtration in Vaccine Bioprocessing" D.K. Roper, A. Johnson, A. Lee, J. Taylor, C. Trimor and E. Wen
96. *Recovery of Biologics Conference IX*, Whistler, Canada, May, 1999: "Application of Process Simulation Software to a Vaccine Manufacturing Process" T. Shanklin, P.K. Yegneswaran, D.K. Roper, M.R. Marten
97. *Graduate Student Research Day*, Baltimore, MD, Apr. 1999: "Simulation of a Manufacturing Scale Vaccine Process using Commercially Available Software" T. Shanklin, P.K. Yegneswaran, D.K. Roper, M.R. Marten
98. *A.I.Ch.E. Annual Meeting*, Miami, FL, Nov 15-20, 1998: "Membrane Fouling During Ultrafiltration of a Clarified Bacterial Fermentation Broth" H. Pujar, P. McHugh, M. Gayton, D.K. Roper and A. Lee
99. *A.I.Ch.E. Annual Meeting*, Miami, FL, Nov 15-20, 1998: "Evaluation of Process Simulation Software for Use as a Technology Transfer Tool", T. Shanklin, M. Marten, D.K. Roper, and P.K. Yegneswaran
100. *North American Membrane Society Annual Meeting*, Cleveland, OH, May 16-20, 1998: "Membrane Adsorption Designed for Pharmaceutical Processes" D.K. Roper
101. *Vaccine Bioprocess Engineering Scientific Meeting*, Merck Research Laboratories, Branchburg, NJ, April 24, 1997: "New Pneumovax Process Development: A Documentary," D.K. Roper
102. *M.R.L. Bioprocess R&D Princeton Meeting*, Princeton NJ, Nov 15, 1996: "Improved Outer Membrane Protein Complex: Fermentation & Purification Development & Demonstration," J. Fu and D.K. Roper
103. *M.R.L. 2nd Biannual Bioseparations Study Group*, Branchburg NJ, July 13, 1995: "Isolation and Purification of OMPC from *N. meningitidis*: Sialic Acid Removal," D.K. Roper, E. Wen and A. Lee
104. *Engineering Foundation Conference: Biochemical Engineering IX, 1994*: "A Novel Approach to Vaccines: Naked Plasmid DNA," A.L. Lee, S.L. Sagar, D.K. Roper, S. Bierlmaier, W.-J. Sun and C. Lee
105. *A.I.Ch.E. Annual Meeting*, San Francisco CA, Nov 13-18, 1994: "Developing Performance Standards for Adsorptive Bioseparations by Magnetic Resonance Measurements," D.K. Roper and E.N. Lightfoot
106. *PREP Symposium & Exhibit*, Washington DC, June 12-15, 1994: "Preparative Stacked-Membrane Chromatography of Proteins and Optical Isomers," D.K. Roper and E.N. Lightfoot
107. *A.I.Ch.E. Annual Meeting*, St. Louis MO, Nov 7-12, 1993: "Characterizing Mass Transfer in Adsorptive Bioseparations using Magnetic Resonance Imaging," D.K. Roper and E.N. Lightfoot
108. *Amoco/University Poster Session*, Naperville IL, Oct 8, 1993: "Improving Mass Transport in Protein Chromatography by Magnetic Resonance Imaging," D.K. Roper and E.N. Lightfoot
109. *N.I.H. Biotechnology Training Program Poster Session*, Madison WI, Spring 1993: "Chromatographic Separations Using Just a Few Plates," D.K. Roper and E.N. Lightfoot
110. *12th International Symposium on HPLC of Proteins, Peptides & Polynucleotides*, Sydney, Australia, 1992: "Adsorptive Membrane Separations," E.N. Lightfoot, J. Coffman, K. Rath, D.K. Roper and A. Athalye
111. *N.I.H. Biotechnology Training Program Poster Session*, Madison WI, Spring 1992: "Designing Large-Scale Protein Chromatography using N.M.R.," D.K. Roper, A.A. Athalye and E.N. Lightfoot

112. *Regional A.I.Ch.E. Conference*, Rapid City SD, Spring 1988: "Macrocycle-Mediated Cation Transport Using Hollow Fiber Supported Liquid Membranes," D.K. Roper, R.M. Izatt, R.L. Bruening and J.D. Lamb

## CLINICAL BIOPHARMACEUTICAL PRODUCTS

### TECHNICAL BIOPHARMACEUTICAL REPORTS

1. Roper, D.K. "Preparation of Phytochlorin E6" (for use in Aptocine™) to Frontier Scientific, Aug 2006.
2. Roper, D.K. "Adenovirus Type 5 Flgag Phase I Clinical Purification Process Development Summary", Merck Research Laboratories Bioprocess R&D, 3 Dec 1999.
3. Taylor, J., A. Johnson and D.K. Roper, "Campaign Report for New Pneumovax®23 8+15 Clinical Formulation Process", Merck Research Laboratories Bioprocess R&D, 31 August 1998.
4. Roper, D.K. and C. Trimor, "Demonstration Purification Report for 1996 Improved Process for Outer Membrane Protein Complex from *Neisseria meningitidis*", Merck Research Laboratories Bioprocess R&D, 15 July 1997.
5. Roper, D.K., "Basis of Design Document and Process Skid Package Specification for Pilot Pneumovax Tee-Mix Skid", Merck Research Laboratories Bioprocess R&D, 10 March 1997.
6. Lander, R., M. Gayton, D.K. Roper and A.L. Lee. "Basis of Design Document for New Pneumovax®23 Isolation and Purification Process", Merck Research Laboratories Bioprocess R&D, 10 October 1995.
7. Roper, D.K., "Protein Capture in a Fluidized Bed: Ion Exchange Capture of Acidic Fibroblast Growth Factor from *Escherichia coli* lysate in a Fluidized Bed of SP Spheredex LS", Merck Research Laboratories Bioprocess R&D, 21 August 1991.

### CLINICAL CURRENT GOOD MANUFACTURING PRACTICE (cGMP) PROCESS DOCUMENTS

1. "Manufacturing Process Description. Phytochlorin E6." (Aptocine™) Frontier Scientific, Inc. Logan, UT Jun 2008.
2. "Clinical Batch Sheet. New Pneumovax Formulation Item No. 90000-616", Merck Research Lab Bioprocess R&D, May 1998.
3. "Clinical Batch Sheet. New Pneumovax Prod. 39085", Merck Research Lab Bioprocess R&D, Oct 1997.
4. "Manufacturing Process Description. *Neisseria meningitidis* Outer Membrane Protein Complex Purification (Improved Process) Product 39025", Merck Research Lab Bioprocess R&D, 19 March 1996.
5. "Process Document for the Purification of Supercoiled Plasmid DNA from *Escherichia coli* - VIII. STDVB Reversed-Phase Column Chromatography", Merck Research Lab Bioprocess R&D, 13 Nov 1994.

### cGMP LABORATORY PROCEDURES

1. "Assembly of Heat Lysis Equipment", Merck Research Laboratories Bioprocess R&D, 31 October 1994.
2. "Assembly and Cleaning of Vantage Bioprocess Columns", Merck Research Laboratories Bioprocess R&D, 26 October 1994.
3. "Packing Vantage Bioprocess Columns with STDVB Resin and Sanitization", Merck Research Laboratories Bioprocess R&D, 26 October 1994.
4. "Unpacking and Cleaning of Vantage Bioprocess Columns", Merck Research Laboratories Bioprocess R&D, 26 October 1994.

### VIDEOTAPES PRODUCED

1. “The New Pneumovax<sup>®</sup> Pilot Purification Process”, Merck Research Laboratories Bioprocess R&D, December 1997.
2. “Process Safety: Chromatography, Ultrafiltration, Process Vessels and Autoclaves”, Merck Research Laboratories Bioprocess R&D, 6 November 1997

## STUDENT RESEARCH SUPERVISION

GRADUATE STUDENT SUPERVISION (13 students graduated; 5 students current)

- Terry Shanklin (Jan 1998-June 1998) M.S. 1999. Engineer. Pfizer Inc., Groton, CT  
 Thesis: *Application of Process Simulation Software to an Industrial Biotechnology Process*  
 \* co-advisor with M. Marten, UMBC
- Ken Excel (Sept 2004-May 2005): M.E. 2005. Manager. Chevron North America, Bakersfield, CA  
 Project: *Hydrogen Sustainability: Photovoltaic Hydrogen Production Prototype*
- Nick Kamerath (Jan 2007-Aug 2008): M.S. 2008. Engineer. WaferTech LLC, Portland Oregon  
 Thesis: *Kinetic & Equilibrium Analysis of Solvent Precipitation of Sodium Phytochlorin*
- Wonmi Ahn (Aug 2005-Aug 2010): Ph.D. 2010. Post-doc. Boston University, Boston, MA  
 Thesis: *Novel electroless gold nanoarchitectures to enhance photon-plasmon coupling*
- Ben Taylor (May 2007-Dec 2010): M.S. 2011. Engineer. Micron, Inc, Lehi, UT  
 Thesis: *Methods for streamlining expensive function calls*
- Drew DeJarnette (Aug 2010-May 2012): M.S. 2012. Ph.D. Student. Univ of Arkansas. Fayetteville, AR  
 Thesis: *An Extension to Particle Polarizability to Predict Coupling in Periodic Nanoplasmonic Arrays*
- Laura Velasco (Oct 2010-May 2012): M.S. 2012. Engineer. Mars Foods, Inc. Los Angeles, CA.  
 Project: *Effects of Frustule Lattice Geometry on the Characteristic Optical Properties of Diatoms*
- Phillip Blake (Dec 2006-Dec 2012): Ph.D. 2012. Engineer. Inaugural Arkansas Teacher Corps.  
 Thesis: *Refractive Index Chemical Sensing with Noble Metal Nanoparticles*
- Gyoung Gug Jang (Sept 2008-Nov 2012): Ph.D. 2012. Post-doc. Oak Ridge National Laboratory  
 Thesis: *Modeling, Fabrication, and Characterization of Scaleable Electroless Gold Plated Nanostructures for Enhanced Surface Plasmon Resonance*
- Aaron Russell (Sept 2008-July 2012): Ph.D. 2012. Engineer. Halliburton  
 Thesis: *Plasmonic Pervaporation via Gold Nanoparticle Functionalized Nanocomposite Membranes*  
 ■ NSF Graduate Research Fellow
- Xingfei Wei (Aug 2012-Dec 2013): M.S. 2013. Engineer. Resin Mfg.  
 Thesis: *Tin Sensitization for electroless plating*
- Gregory Forcherio (July 2012-May 2014): M.S. 2014. Ph.D. Student University of Arkansas  
 Thesis: *Infrared Energy Harvesting for Optoplasmonics from Nanostructured Metamaterials.*
- Drew DeJarnette (May 2012-Aug 2014): Ph.D. 2014. Post-doc. University of Tulsa  
 Thesis: *Electron energy loss spectroscopy of field enhancements in plasmon nanostructures on graphene*



Jeremy Dunklin (May 2012-present): Ph.D. Student current

Thesis: *Investigating diffraction coupled polarization*

Status: Expected graduation date Spring 2016

- NSF Graduate Research Fellow

Gregory Forcherio (June 2014-present): Ph.D. Student current

Thesis: *Electron optics of plasmon nanostructures*

Status: Expected graduation date Spring 2016

- NSF Graduate Research Fellow

Vinith Bejugam (Aug 2012-present): Ph.D. Student current

Thesis: *Plasmon enhanced membrane distillation*

Status: Expected graduation date Spring 2016

Keith Berry (Aug 2014-present): Ph.D. Student current

Thesis: *Plasmonic doped metal oxides*

Status: Expected graduation date Spring 2018

Roy French (Aug 2014-present): Ph.D. Student current

Thesis: *Electron optics of plasmon enhanced dichalcogenides*

Status: Expected graduation date Spring 2017

#### GRADUATE STUDENT RESEARCH COMMITTEE MEMBER (22 students to date)

1. Bin Wan (Dr. Terry Ring, Advisor, Chemical Engineering Dept.)
2. Srinath Rangarajan (Dr. Bonnie Tyler, Advisor, Chemical Engineering Dept.)
3. Prasanna Khot (Dr. Bonnie Tyler, Advisor, Chemical Engineering Dept.)
4. Sachin Attavar (Dr. Bonnie Tyler, Advisor, Chemical Engineering Dept.)
5. Gordon Russell (Dr. Geoff Silcox, Chair, Chemical Engineering Dept.)
6. Ameya Kantak (Dr. Bruce Gale, Advisor, Mechanical Engineering Dept.)
7. Yue Zhao (Dr. Henry White, Advisor, Chemistry Dept.)
8. Chris Nielsen (Dr. C. Dale Poulter, Advisor, Chemistry Dept.)
9. In Kwang Kim (Dr. Vasu Varadan, Advisor, Electrical Engineering Dept.)
10. Nancy Elizabeth Prior (Dr. Christa Hestekin, Advisor, Chemical Engineering)
11. Ellen Brune (Dr. Bob Beitle, Advisor, Chemical Engineering)
12. Sun Waldron (Dr. Julie Stenken, Advisor, Chemistry Dept.)
13. Wu Jiang (Dr. Omar Manasreh, Advisor, Electrical Engineering Dept.)
14. Sabina Koukourinkova (Dr. Greg Salamo/Dr. Vasyl Kunets, Advisor,  $\mu$ EP Program)
15. Melissa Hebert (Dr. Shannon Servoss, Advisor, Chemical Engineering)
16. Khaled AlShurman (Dr. Julie Stenken, Advisor, Chemistry)
17. Guanghui Song (Dr. Xianghong Qian, Advisor, Chemical Engineering)
18. Chris Thomasen (Dr. Greg Salamo, Advisor, Electrical Engineering)
19. Nazariy Andrushchak (Dr. Greg Salamo, Advisor, Microelectronics/Photonics Program)
20. Samuel Beckford (Dr. Min Zou, Advisor, Microelectronics/Photonics Program)
21. Jeffrey Martinez (Dr. Jerry Havens, Chemical Engineering)
22. Desalegn Debu (Dr. Joseph Herzog, Physics)

## POST-DOCTORAL SUPERVISION

Yanil Dall'Asen (May 2007-May 2008): Post-doctoral scholar. University of Utah, Dept of Biology  
 Status: Ph.D. (Physics); Post-doctoral student (Physics)  
 Project: *Raman scattering in Nano colloids: Surface enhancement, Temperature measures, and Control of electronic states in porphyrins*

Phillip Blake (Jan 2013- Jun 2014): Post-doctoral scholar. State of Arkansas, Dept of Education  
 Status: Ph.D. (Chemical Engineering); Post-doctoral student (Chemical Engineering)  
 Project: *Engineering band structures in nanocomposite metamaterials.*

Milana Lisunova (Mar 2013- Jan 2015): Post-doctoral scholar. University of Arkansas, Dept of Chem Eng  
 Status: Ph.D. (Physics); Post-doctoral student (Chemical Engineering)  
 Project: *Surface science of nanocomposite metamaterials.*

## UNDERGRADUATE STUDENT RESEARCH SUPERVISION

>79 undergraduate student mentored to date

\*32 to date pursued graduate education

†35 to date from underrepresented populations

±11 to date published in peer-reviewed journals (18 publications co-authored by undergraduates)

2 to date are university faculty

1 to date is a university research staff

## UNIVERSITY TEACHING

## UNIVERSITY OF UTAH

*Ch En 4253: Process Design I (Fall 2002-Fall 2007)*

## Curriculum Innovations

- Introduced Aspen Plus 11.1 process design simulator. Initiated Student/Industry Design Projects in which student teams worked with Flying J Inc. (Jeff Utley (MS, 1984)), Energy Resources Group (George Foster), Chevron, Ceramatec Inc., and ZARS. Introduced team-based instruction using instructional objectives, team assignments, preferred learning styles, and peer evaluation.

## Significant Results

- A student/industry partnership with Ceramatec developed the basis of design for a P3 award from EPA. Industrial partners Flying J, Ceramatec and ZARS each hired additional UofU chemical engineers after the program was initiated.

*Ch En 3603: Mass Transport and Separations (Spring 2004-2008)*

## Curriculum Development

- Typed class notes were prepared for the students for each day of the course. Notes contained lecture outline and examples and highlighting key concepts. Changes were made to syllabus, objectives, classroom learning environment, grading strategy, homework assignments and exams using best practices learned from ChFEN 4253 and university teaching courses.

## Significant Results

- Student feedback was positive regarding course notes and enthusiasm in this course. Class and instructor scores increased to at or above department averages in 2006.

*Ch En 5503/6503: Instrumental Analysis (Fall 2004-2006, Spring 2004)*

## Curriculum Innovations

- Instrumental Analysis was integrated into the first 8 weeks of the Senior Year. New SOPs for HPLC, GC, FTIR, TGA and UV-vis were developed. SOPs for viscometry, densitometry and AA were revised.

## Significant Results

- Students integrated analytical procedures mastered in instrumental analysis into their individual research projects and into senior lab experiments.

*ChFEN 1703: Introduction to Chemical Engineering - MATLAB (Fall 2002, Spring 2002-2003)*

## Curriculum Innovations

- Implemented Team-Based Instruction using instructional objectives, team assignments, preferred learning styles, and peer evaluation.

## Significant Results

- Students developed proficiency applying MATLAB to a variety of practical chemical engineering problems. Team-based learning reduced student's learning curve and improved average performance.

*ChFEN 4903/4905: Safety Lectures, Projects Lab I and II (Fall 2001-2003, Spring 2002-2003)*

## Curriculum Innovations

- Developed instructional materials for students in Industrial Practices, Hazards and Fires/Explosions integrating recent industrial examples with classic safety-training video footage

## Significant Results

- Students enjoyed learning about safety, which hopefully improves retention as well as implementation and compliance.

*Ch En 4975: Hydrogen Sustainability (Fall 2004, Spring 2005)*

## Curriculum Innovations

- This was a novel, EPA-funded K-12/university interdisciplinary service-learning course initiated by Dr. Roper with Ed Trujillo in coordination with the Bennion Center (Marshall Welch) and the Academy for Math, Engineering and Science (AMES) (Al Church). Communication consultants from CLEAR (Katie Sullivan) and the Communication Dept. (Amy Wolfsen) assessed results. Interdisciplinary high-school/undergrad/graduate student teams built a novel photovoltaic hydrogen production prototype.

## Significant Results

- Three (25%) of the twelve 11<sup>th</sup> graders from AMES who participated in the EPA-funded Hydrogen Sustainability project are taking freshman university courses to Chemical Engineers (two at UofU).
- One refereed journal publication resulted: Roper, D.K. and Trujillo, E.M. Photovoltaic Hydrogen Production Prototype for Hydrogen Sustainability. *J. Eng. Sust. Dev.* 1 (2006) 77-84.
- Two assessment papers were published in rigorously reviewed conferences with archival proceedings: (i) Sullivan, K.R. (2005a). Conducting mixed method research: An interdisciplinary service learning approach. Annual Conference and Exposition of the ASEE, June 12-15, 2005 Portland, OR.; (ii) Sullivan, K.R. (2005b). Implementing process while continuing to focus on task. Annual meeting of the Western States Communication Association, San Francisco, CA.
- The EPA awarded Honorable Mention to Hydrogen Sustainability: Photovoltaic Hydrogen Production Prototype in a nationwide competition between 66 universities. Only 7 schools were so honored.
- "Ch En 4975: Hydrogen Sustainability" was nominated for "Bennion Center Service Learning Class of the Year"
- Roper was nominated for "Bennion Center Service Learning Professor of the Year" for 2005.
- Roper was invited to speak at a Faculty Colloquia on Civically Engaged Scholarship (University of Utah, Salt Lake City, UT Sept 29, 2005).
- Roper was invited to speak at the Utah Campus Compact (Board of Regents) Civic Engagement Retreat (Alta, UT Aug 7-8, 2006).
- Roper was invited to contribute to the State of Engagement report which highlights outstanding examples of Service Learning in the State of Utah.
- Roper (co-PI) was awarded NSF/DUE 0652982 (\$1,998,012, Sept 2007 – Aug 2012) Utah's Engineers: A statewide initiative for growth, to expand this program statewide.

- Five posters and presentations resulted from the course. Results received major media exposure in six venues.

## UNIVERSITY OF ARKANSAS

### *Ch En 3153: Non-equilibrium Mass Transfer (Spring 2009-Summer 2012)*

#### Curriculum Innovations

- Introduced Blackboard™ class management software. Introduced ‘Clicker’ interaction technology from Turning Technologies, Inc. Implemented collaborative learning strategies including instructional objectives, team assignments, accommodating preferred learning styles, and peer evaluation. Introduced daily student-led reviews, in-class assignment, and lecture participation; and student teams.
- Initiated Student/Community Projects. Student teams identified projects of interest with a mass-transfer component to local civic, industrial (Kelco, Inc.), and academic institutions (Springdale H.S.). Students created industry or classroom demonstrations of mass transfer principles for the community institution. Effectiveness of student presentations and projects were evaluated by statistically significant measures.

#### Significant Results

- Student test scores improved 30% on average, while standard deviation decreased by one-half.
- Student satisfaction in the course increased significantly, as measured by informal feedback.
- Many students participated enthusiastically in projects and felt it was invaluable career preparation.

### *Ch En 4163: Equilibrium Stage Separations (Fall 2009-Fall 2011)*

#### Curriculum Innovations

- Introduced collaborative learning strategies including instructional objectives, team assignments, accommodating preferred learning styles, and peer evaluation. Also introduced daily student-led reviews, in-class assignment, and lecture participation; student teams; and student involvement in didactic presentation.
- Initiated Student/Community Projects. Student teams identified projects of interest with a mass-transfer component to local and international civic, industrial, and academic institutions. Students created industry or classroom demonstrations of mass transfer principles for the community institution. Effectiveness of student presentations and projects were evaluated by statistically significant measures.

#### Significant Results

- Students conducted five presentations about Chemical Engineering with 33+ University of Arkansas non-STEM students (some in the intramural/recreational outdoor connection center, OCC).
- Students conducted two outreach presentations about Chemical Engineering to 120 10<sup>th</sup> grade Engineering Academy students at Springdale High School.
- Student test scores improved 10 points, while standard deviation decreased by about 10 points
- Student satisfaction in the course was extraordinary. Many said it was the best course they had taken.
- Many students participated enthusiastically in projects and felt it was invaluable career preparation.

### *Ch En 488V/588V: Nano Bio Photonics (Spring 2011)*

#### Curriculum Innovations

- Introduced collaborative learning strategies including instructional objectives, team assignments, accommodating preferred learning styles, and peer evaluation. Also introduced daily student-led reviews, in-class assignment, and lecture participation; student teams; and student involvement in didactic presentation.

#### Significant Results

- Students were supported to prepare manuscripts and research proposals for M.S. and Ph.D. candidates.

**SERVICE (COMMUNITY)**

<i>Robert R. Gray Elementary School:</i>	Panelist	Capitol Heights, MD Nov 17, 2014
	Panelist	Capitol Heights, MD Nov 18, 2013
<i>Springdale High School:</i>	Advisor	Springdale, AR, June 2013
<i>Washington Jr. High School:</i>	Mentor	Fayetteville, AR, Apr 25-26, 2012
<i>New School Science &amp; Engineering Fair:</i>	Panelist	Fayetteville, AR, Feb 2011
<i>Academy for Math, Engineering &amp; Science:</i>	Guest Instructor	Salt Lake City, UT, Jan-May 2005
	Panelist	Salt Lake City, UT, Nov 2005
<i>Bennion Center:</i>	Volunteer: Utah Food Bank, Partnerships	Salt Lake City, UT, Fall 2005
<i>Campaign Volunteer:</i>	Leslie R-Benz City Council Campaign	Salt Lake City, UT, Aug-Nov 2005
<i>Boy Scouts of America:</i>	Asst. Scoutmaster, Varsity Coach	Doylestown, PA. Troop 262 1994-98
	Asst. Scoutmaster	Madison, WI. Troop 201 1991-92
<i>Doylestown Choir:</i>	Piano/Organ Accompanist - Christmas 1996 Cantata, Battle Hymn of the Republic	
<i>University of Wisconsin Eagle Heights Assembly:</i>	Representative, 1992-93, Committees: Safety, Rent	

## REFERENCES

### **D. KEITH ROPER, Ph.D.**

#### Dr. Mihail Roco

Senior Advisor for Science and Engineering  
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Dr. Mihail Roco is the Senior Advisor for Science and Engineering at the National Science Foundation. He is the founding chair of the U.S. National Science and Technology Council's subcommittee on Nanoscale Science, Engineering and Technology (NSET). He has held professorships at University of Kentucky, California Institute of Technology, Tohoku University, Johns Hopkins University, and Delft University of Technology. Dr. Roco has contributed over 250 articles and 21 books on multiphase systems, laser visualization, computer simulations, nanoparticles and nanosystems, trends in emerging technologies, and societal implications. Dr. Roco led the nanoscience and engineering area in the Engineering Directorate in which I worked. I have interacted with Dr. Roco in administering multi-institutional, interdisciplinary center programs in the Network for Computational Nanotechnology (NCN) and Engineering Research Center (ERC) programs at NSF. As architect of the U.S. nanoscale science and engineering program, beginning in 1991, Dr. Roco can discuss my management of the NCN and nanoscale ERC programs. From his background in lasers, computers, nanosystems, and emerging technologies, he can comment on the merit of optical and electromagnetic aspects of my work in bioinspired electrodynamic modeling and in nano- and meta-materials to advance neurotechnology, combat disease, and promote energy and water sustainability.

#### Dr. Max Vögler

Director  
DFG Office North America/Washington  
1776 I Street NW, Suite 100  
Washington, DC 20006  
Phone: 202 785 4208  
Fax: 202 785 4410  
E-mail: [Max.Voegler@dfg.de](mailto:Max.Voegler@dfg.de)

Dr. Vögler was the DFG (German) co-organizer of the DFG-NSF Research Conference "New Perspectives of Neurotechnology and Neuroengineering" on Nov 13-14, 2011. This was the eighth in a series of annual DFG-NSF Joint Meeting. I co-organized the meeting, supporting

interactions between the Center for Sensorimotor Neural Engineering at University of Washington, for which I was Program Director, and BrainLinks BrainTools™ at the University of Freiburg, Baden Wurttemberg, Germany. Invited participants worldwide considered overarching challenges in brain-computer interfaces, computation, and control, and developed a roadmap for Neural Engineering published in *IEEE Trans Biomed Eng* 2016 63(7):1354-67. Dr. Vögler can comment on organizational and programmatic aspects of my activity as an NSF Program Director supporting international scientific interactions and liaising with DFG and German institutions.

Dr. Leon Esterowitz

Program Director

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Dr. Esterowitz is a Program Director in the Division of Chemical, Biological, Environmental, and Transport Systems in the Engineering Directorate at the National Science Foundation. His programs include NSF/FDA Scholar-in-Residence at FDA, Optics and Photonics (OP), and Partnerships for Innovation: Building Innovation Capacity (PFI:BIC). He led the Quantum Electronics group at Fort Belvoir and served in various positions in the Optical Sciences Division at the Naval Research Laboratory. Dr. Esterowitz has contributed over 300 articles on infrared imaging, infrared lasers, optics and photonics. I have worked with Dr. Esterowitz in administering the ERC program, managing panel reviews, and reviewing proposals. He is the disciplinary program director for the Revolutionizing Metallic Biomaterials (RMB) Engineering Research Center, which develops ‘smart’ resorbable metallic implants to improve current medical and surgical treatments for orthopedic, craniofacial, neural, and cardiovascular ailments. From his background in optics and photonics applied to biological and medical systems, he can comment on the merit of biological, optical, and electromagnetic aspects of my work in bioinspired electrodynamic modeling and in nano- and meta-materials to advance imaging and to modulate biological information, creating new ways to combat disease and induce cell and tissue responses.

Dr. Alex Simonian

Program Director

Division of Materials Research

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Dr. Simonian is a Program Director in the Division of Materials Research in the Mathematical and Physical Sciences Directorate at the National Science Foundation. His programs include biomaterials (BMAT) and developing a National Research Infrastructure for Neuroscience (NeuroNex). He has held professorships at Auburn University and Texas A&M and has worked at professional, academic and industrial institutions in Armenia, Russia, Lithuania, Latvia, Germany, Czechoslovakia, and Italy. Kentucky, California Institute of Technology, Tohoku University, Johns Hopkins University, and Delft University of Technology. He is a member of the Armenian Academy of Engineering (1994). His research interests are in the areas of bio-analytical sensors, nano/biomaterials, and functional interfaces. I have worked with Dr. Simonian in administering the ERC program, managing panel reviews, and reviewing proposals. He is a disciplinary program director for the ASSIST Engineering Research Center, which develops self-powered, wearable health monitors to advance wireless health monitoring and wellness. From his background in bio-analytical sensors, nano/biomaterials, and functional interface, he can comment on the merit of biological, sensing, and materials aspects of my work in developing advanced materials and next-generation devices.

Dr. Khershed Cooper

Program Director  
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Engineering Directorate  
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Dr. Cooper is a Program Director in the Division of Civil, Mechanical and Manufacturing Innovation in the Engineering Directorate at the National Science Foundation. He manages the Scalable Nanomanufacturing (SNM) program and represents NSF on the National Science and Technology Council's subcommittee on Nanoscale Science, Engineering, and Technology where he co-chairs the Nanotechnology Innovation, Liaison with Industry working group. He served as Program Officer for the Manufacturing Science Program at the Office of Naval Research and was Senior Materials Scientist in the Materials Science and Technology Division of Naval Research Laboratories. He has nearly 140 publications, 150 invited talks, and 70 contributed presentations. His interests are in advanced materials processing and nano-manufacturing. He is a Fellow of ASM International. I have worked with Dr. Cooper in administering the ERC, NCN, and NSEC programs, managing panel reviews, and reviewing proposals. He is a disciplinary program director for the NASCENT Engineering Research Center, which develops scalable nanomanufacturing capacity for advanced materials and devices. From his background in manufacturing, materials, and nanotechnology, Dr. Cooper can comment on the merit of



materials and nanotechnology aspects of my work in developing advanced bio-, nano-, and meta-materials and next-generation devices to advance information technologies and promote energy and water sustainability in scalable systems.

## D. KEITH ROPER, Ph.D.

### Summary of Activity since Aug 26, 2016

#### Appointments

- *Associate Director*, Microelectronics Photonics Graduate Program, University of Arkansas. Lead graduate student advising. Develop, administer, and assess graduate candidacy examinations.
- *Committee Member*, Institute for Nanoscience and Engineering, University of Arkansas. Participate in forming a new Materials Science and Engineering Graduate Program

#### Awards & Recognition

- *Faculty Research Accomplishment*, College of Engineering, University of Arkansas. \$1,000 travel reimbursement grant to recognize publication record.

#### Invited Speaker

- 2016 SPIE Optics + Photonics, San Diego, CA, Aug 28- Sept 1, 2016: "Interactions between confined fields and carriers at interfaces between two-dimensional materials and nanoscale metal architectures." D.K. Roper (with D. DeJarnette, G. Forcherio)
- Chemical Engineering Program, Arizona State University, Tempe, AZ, Sept 19, 2016: "Innovation frameworks and functional electrodynamics in nano-, bio- and meta-materials" D.K. Roper
- Dept. of Physics, Astronomy and Materials Science, *Missouri State University*, Springfield, MO, Sept. 23, 2016: "Innovation frameworks and functional electrodynamics" D.K. Roper
- NSF NRC-SEES: Predictive Modeling Network for Sustainable Human-Building Ecosystems (SHBE), Sept 30-Oct 1, 2016: "Integrating cross-institutional interdisciplinary engineering education/research challenges and strategies" D.K. Roper

#### Invited Participant

- *Panelist*, National Institutes of Health. Special Emphasis Panel/Scientific Review Group, 2016.
- *Invited Participant*, Prototype to Patient Treatment Workshop, National Institutes of Health, Bethesda, MD, Oct. 25, 2016.
- *Invited Participant*, Multiferroic Strategy Meeting/Workshop for Meso-Micro RF Devices, UCLA. Nov. 15, 2016.
- *Invited Participant*, Olin College EXPO, Olin College of Engineering, Needham, MA, Dec. 19, 2016.

#### Publications & Proceedings

- Forcherio, G.T., Benamara, M., Roper, D.K. Electron energy loss spectroscopy of hot electron transport between gold nanoantennas and molybdenum disulfide by plasmon excitation. *Adv. Opt. Mater.* (2016) DOI: 10.1002/adom.201600572. Accepted Sept 22, 2016.
- Roper, D.K., Forcherio, G.T., and DeJarnette, D. Compact simulation guides subnanometer, femtosecond measures of energy transfer between quasiparticles and hot carriers at interfaces between metals and two dimensional materials. *Proc. SPIE 9923-38 Physical Chemistry of Interfaces and Nanomaterials XV*. Aug 30, 2016.
- Roper, D.K., DeJarnette, D., Forcherio, G.T. Interactions between confined fields and carriers at interfaces between two-dimensional materials and nanoscale metal architectures. *Proc. SPIE 9924-8 Low Dimensional Materials and Devices*. Aug 30, 2016.
- Forcherio, G.T., Benamara, M., Roper, D.K., Plasmon excitation and damping in noble metal nanoparticle-MoS<sub>2</sub> nanocomposites. *Proc. SPIE 9919-34 Nanophotonic Materials XIII* Aug 31, 2016.
- Dunklin, J.R., Forcherio, G.T., Berry, K.R., Roper, D.K., Interfacial reflection enhanced optical extinction and thermal dynamics in polymer nanocomposite films. *Proc. SPIE 9919-30 Nanophotonic Materials XIII* Aug 31, 2016.
- Dunklin, J.R., Roper, D.K. Enhanced thermal dissipation in diffractive metal nanoparticle-polymer films. Submitted.
- Berry, K.R., Roper, D.K., Dunklin, J.R., Chambers, C. Programmable geometry- and composition-dependent thermal dynamics using refined metal-polymer thin films. Submitted.

#### Presentations

## **D. KEITH ROPER, Ph.D.**

- *SPIE Optics + Photonics*, San Diego, CA. Aug. 28-Sept 1, 2016: Compact simulation guides subnanometer, femtosecond measures of energy transfer between quasiparticles and hot carriers at interfaces between metals and two dimensional materials. Roper, D.K., Forcherio, G.T., and DeJarnette, D.
- *SPIE Optics + Photonics*, San Diego, CA. Aug. 28-Sept 1, 2016: Plasmon excitation and damping in noble metal nanoparticle-MoS<sub>2</sub> nanocomposites. Forcherio, G.T., Benamara, M., Roper, D.K.
- *SPIE Optics + Photonics*, San Diego, CA. Aug. 28-Sept 1, 2016: Interfacial reflection enhanced optical extinction and thermal dynamics in polymer nanocomposite films. Dunklin, J.R., Forcherio, G.T., Berry, K.R., Roper, D.K.

### *Peer Reviewer*

- *Sensors & Actuators: B. Chemical*
- *J. Phys. Chem. C.*

### *Proposals Submitted*

- Factors influencing the development and prevention of microcephaly caused by Zika virus infection, National Institutes of Health, D.K. Roper, co-PI (with R. Roper, J. Starbuck).
- Surface plasmon resonance measurement of membrane tortuosity, NSF I/UCRC Membrane Science, Engineering & Technology Center, D.K. Roper, PI.