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EDUCATION

- Ph.D. 5/2002 Major: *Mechanical Engineering*, Minor: *Electrical Engineering*, North Carolina State University, Raleigh, North Carolina.
- M.S. 8/1999 *Mechanical Engineering*, Iowa State University, Ames, Iowa.
- M.E. 3/1998 *Precision Instrument Engineering*, Tianjin University, China.
- B.S. 7/1995 *Precision Instrument Engineering*, Tianjin University, China.

EXPERIENCE

- 1/2016 – present ***Distinguished R&D Staff Scientist***, Surface Processing & Mechanics Group, Materials Science & Technology Division, ORNL
- 10/2011 – 12/2015 *Senior R&D Staff Scientist*, Surface Processing & Mechanics Group, Materials Science & Technology Division, ORNL
- 9/2011 – present *Adjunct Associate Professor*, Department of Materials Science & Engineering, University of Tennessee – Knoxville
- 1/2007 – 9/2011 *R&D Staff Scientist, Surface Processing & Mechanics Group*, Materials Science & Technology Division, ORNL
- 2/2004 – 12/2006 *Junior R&D Staff Scientist*, Surface Processing & Mechanics Group, Metals & Ceramics Division, ORNL
- 5/2002 – 2/2004 *Postdoctoral Research Associate*, Surface Processing & Mechanics Group, Metals & Ceramics Division, ORNL

RESEARCH INTERESTS

- Advanced lubrication for energy efficiency
- Surface engineering for wear and corrosion protection
- Nuclear tribology
- Nanostructured energy materials
- Manufacturing

HONORS

- ***R&D 100 Award*** (Team lead), jointly among ORNL, GM, Shell, and Lubrizol, Ionic liquid anti-wear additives for fuel-efficient engine lubricants, R&D Magazine, 2014.
- ***U.S. DOE Vehicle Technologies Office R&D Award***, for research achievements in ionic liquid lubricants and additives, 2014.
- ***John Bollinger Outstanding Young Manufacturing Engineer Award***, Conferred in recognition of significant achievement and leadership in manufacturing engineering, Society of Manufacturing Engineers (SME), 2009.
- *Invited attendee to U.S. Frontiers of Engineering Symposium*, National Academy of Engineering (NAE), 2015.
- *ORNL Significant Event Award*, Discovery and fundamental understanding of incompatibility between diamond-like-carbon coatings and lubricant additives provide new insights for future materials development, 2015.

- *ORNL Significant Event Award*, Development of lubricant that meets DOE goal of 2 percent vehicle fuel economy improvement, 2014.
- *ORNL Significant Event Award*, Breakthrough in ionic liquid lubricants recognized by a major DOE program award, 2011

MEDIA REPORTS

1. "ORNL, Shell develop a less friction/wear hybrid lubricant additive," *World Industrial Reporter*, Sept. 2, 2015.
2. "Reduce wear with synergistic lubricant pair," *Materials Views*, July 28, 2015.
3. "The infinite possibilities of ionic liquids," *Fuels & Lubes International*, July 2015.
4. "Low-friction engine oil," *R&D Magazine*, August 19, 2014.
5. "National lab: New oil additive saves 2% on gas," *USA Today,* July 28, 2014
6. "Lab rolls out ideas for future vehicles," *Detroit Free Press,* July 27, 2014
7. "Oak Ridge-GM prototype low-viscosity ionic liquid-additized engine oil delivers 2% fuel economy improvement over 5W-30," *Green Car Congress*, Dec. 30, 2013,
8. "Molten salts could improve fuel economy," *Inside Science News*, Nov. 15, 2013
9. "Lubricating titanium," *Tribology & Lubrication Technology,* Nov. 2012
10. "Unleashing the potential of ionic liquids," *Tribology & Lubrication Technology,* Apr. 2010.
11. "Nanocoatings boost industrial energy efficiency," *Science Daily*, Nov. 2008
12. "Supersaturated steel could save energy in factories," *Science Daily*, Aug. 2007.

AFFILIATIONS AND PROFESSIONAL ACTIVITIES

- Committee Member, U.S. DOE Lubricant Working Group, 2015-present.
- Chair, Technical Committee of Lubrication Fundamentals, *Society of Tribologists & Lubrication Engineers* (*STLE*), 2014-present.
- Steering Committee Member, *Wear of Materials*, 2011-present.
- Associate Editor, *Frontiers in Mechanical Engineering – Engine and Automotive Engineering*, 2015-present.
- Technical Editor, *Tribology & Lubrication Technology*, 2009-present.
- Key Reader, *Metallurgical and Materials Transactions A*, 2013-present.
- Chair, Technical Committee of Surface Engineering, *STLE*, 2008-2009.
- Associate Editor for Case Studies and Test Methods, *17th International Conference on Wear of Materials*, Las Vegas, April 19-22, 2009.
- Organizer, Sessions of Lubrication Fundamentals, *2014 STLE Annual Meeting*.
- Organizer, Symposium for Hardfacing Coatings for Wear and Corrosion Resistance Applications, *Materials Science & Technology (MS&T) 2010 and 2012 Conferences*.
- Organizer, Sessions of Surface Engineering, *2008 STLE Annual Meeting*.

SELECTED R&D PROJECTS

- <u>*Advanced lubrication for energy efficiency*</u>

1. Ionic liquids as novel lubricants and lubricant additives for automotive applications (PI, ORNL Seed 2005-06; DOE CRADA w/ GM 2009-13; DOE FOA award CRADA w/ Shell 2012-16; DOE FOA award w/ GM 2015-18)
2. Compatibility of lubricant anti-wear additives on non-metallic hard coatings and non-ferrous bearing alloys (PI, DOE 2013-16)
3. Hybrid ionic-nano-additives for engine lubrication to improve fuel efficiency (co-PI, DOE FOA award w/ UTK and UCM 2015-17)
4. Modified temperature-responsive hyperbranched polymers for improved viscosity and enhanced lubricity (co-PI, DOE FOA award w/ PNNL, 2014-16)

5. Nanodiamond lubricant additives (co-PI, DOE Voucher award w/ Cool-X, 2016)
6. Effects of engine oil aging on friction and wear behavior (co-PI, DOE 2002-05)
7. Diesel fuel injector lubrication and scuffing in ultra low sulfur fuels (co-PI, DOE 2002-05)

- *Surface engineering for wear and corrosion protection*

1. Advanced heavy-duty diesel engine piston materials and coatings (PI, DOE CRADA w/ Cummins 2015-16)
2. Ionic liquids-induced anti-corrosion conversion coatings for Mg alloys (PI, ORNL Seed 2012-14)
3. Surface texturing for friction and wear reduction (PI, DOE 2014)
4. Nanostructured superhydrophobic coatings for drag reduction and anti-corrosion (PI, DOE FOA award w/ Ross Technology and Stevens Institute of Technology, 2009-12)
5. $AlMgB_{14}$-based nanostructured superhard coatings for hydraulic and tooling systems (co-PI, DOE CRADA w/ Eaton, Ames Lab, and Greenleaf, 2007-10)
6. Surface nanocompositing of aluminum alloys via friction stir processing (PI, ORNL LDRD 2006-08)
7. Surface engineering of titanium alloys for diesel engine and brake applications (PI, DOE 2004-08)
8. Low-temperature colossal carbon supersaturation for austenitic stainless steels (co-PI, DOE FOA award collaborated w/ Swagelok and Case Western Reserve U, 2005-08)

- *Nuclear tribology*

1. Grid-to-rod fretting modeling and experimental verification (GTRF), Consortium for Advanced Simulation of Light Water Reactors (CASL) (PI, DOE 2014-17)
2. Lubricant evaluation for nuclear bearing components (co-PI, WFO 2013-15)

- *Nanostructured energy materials*

1. Self-aligned Cu-Si core-shell nanowire array as a novel anode for Li-ion batteries (PI, ORNL Seed 2010-13)
2. Ionic liquids-produced high-quality, low-defect TiO_2 nanotube array for Li-ion batteries & photoelectrochemical water splitting (PI, DOE FOA award, 2009-11)

- *Manufacturing*

1. Thermal drilling of Al, Mg, and Ti alloys (co-PI, DOE w/ U Michigan 2005-07)
2. High-speed titanium machining (co-PI, DOE w/ TWS and U Michigan 2004-06)
3. Grindability of ceramics and TiC-Ni_3Al composites (co-PI, DOE w/ Louisiana State U, 2005)
4. Cylindrical wire electrical discharge machining of metals and MMCs followed by micro-blasting to improve surface integrity (Ph.D. dissertation, 1999-2002)
5. Free-form surface and curve matching for shape conformance checking (M.S. thesis, 1998-1999)

RESEARCH GRANTS (*21 grants of total $13.2M, lead-PI for 14 grants of $9.1M*)

1. J. Qu (PI), M.B. Viola, H. Luo, T.J. Toops, "Development of ionic liquid-additized, GF-5/6 compatible low-viscosity oils for automotive engine and rear axle lubrication for 4% improved fuel economy," jointly with General Motors Corp., competitive solicitation DE-FOA-0000991 by DOE EERE, jointly funded by U.S. Army TARDEC, $1,276,000, FY 2015-18.
2. B. Zhao (UTK PI), J. Qu (ORNL PI), A. Martini (UCM PI), S. Dai, H. Luo, B. Armstrong, "Hybrid ionic-nano-additives for engine lubrication to improve fuel efficiency," DOE EERE Vehicle Technologies Incubator competitive solicitation DE-FOA-0000988, $898,000, FY 2015-17.
3. J. Qu (PI), P.J. Blau, "Grid-to-rod fretting testing and modeling" DOE CASL, $1,100,000, FY 2014-17.

4. D. Leith (Cool-X), J. Qu (ORNL PI), B.H. West, "Nanodiamond lubricant additives," DOE EERE Voucher, $100,000, FY 2016.
5. J. Qu (PI), B.L. Papke, B.G. Bunting, P.J. Blau, S. Dai, H. Luo, C. Chen, "Ionic liquids as multi-functional lubricant additives to enhance engine efficiency," CRADA with Shell Global Solutions (US) Inc., competitive solicitation DE-FOA-0000239 by DOE EERE, $1,200,000, FY 2012-16.
6. J. Qu (PI), R. England, G. Muralidharan, "Investigating and addressing wear in a lightweight heavy-duty diesel engine," CRADA with Cummins Inc., DOE EERE, $250,000, FY 2015-16.
7. J. Qu (PI), "Compatibility of lubricant anti-wear additives (ZDDP and ionic liquid) with non-ferrous bearing materials," DOE EERE, $950,000, FY 2013-16.
8. L. Cosimbescu (PNNL), P. Bhattacharya, T. Bays, S. Sluder, and J. Qu, "Modified temperature-responsive hyperbranched polymers for improved viscosity and enhanced lubricity," competitive solicitation DE-FOA-0000793 by DOE EERE, $1,000,000, FY 2014-16.
9. J. Qu (PI), H. Luo, H.H. Elsentriecy, G.-L. Song, "Corrosion prevention of magnesium alloys via surface conversion treatments using ionic liquids," ORNL Laboratory Directed Research and Development (LDRD) Seed Money Fund, $190,000, FY 2013-14.
10. J. Qu (PI), P.J. Blau, S. Dai, H. Luo, B.G. Bunting, C. Kim, S.C. Tung, E.W. Schneider, "Ionic liquids as novel lubricants for engine applications," CRADA with General Motors Corp., DOE EERE, $1,000,000, FY 2009-13.
11. J. Qu (PI), "High performance anode for Li-Ion batteries," collaborated with Bren-Tronic Energy Systems, UT-Battelle's PFTT Program Maturation Fund, $50,000, FY 2012-13.
12. J. Qu (PI), H. Luo, N.J. Dudney, D. Ma, "Vertically-aligned Cu-Si core-shell nanowire array as a high-performance anode material for energy storage," ORNL LDRD Seed Money Fund, $183,000, FY 2010-11.
13. J. Qu (PI), J. Simpson, V.K. Sikka, D. Speicher, A. Jones, C.H. Choi, "Nanostructured superhydrophobic coatings for breakthrough energy savings," jointly with Ross Technology and Stevens Institute of Technology, competitive solicitation "Nanomanufacturing Initiative" by DOE EERE, $1,995,000, FY 2009-12.
14. J. Qu (PI) and S. Dai, "Synthesis of highly ordered TiO_2 nanotubes using ionic liquids for photovoltaics applications," competitive solicitation "Nanomanufacturing Initiative" by DOE EERE, $200,000, FY 2010-11.
15. B. Lisowsky (Eaton), D. Zhu, B. Cook, P.J. Blau, J. Qu, V.K. Sikka, C.K. Jun, J. Goldsmith, "Nanocoatings for high-efficiency industrial hydraulic and tooling systems," jointly with Eaton Corp., Ames Lab, and Greenleaf Corp., competitive solicitation DE-PS36-05GO95011 by DOE EERE, $2,000,000, FY 2007-10.
16. J. Qu (PI), Z. Feng, P.J. Blau, X.L. Wang, L. An, J.J. Truhan, E. Lara-Curzio1, H. Wang, S.A. David, "A novel process of thick nanocomposite surfaces for defense applications," ORNL LDRD Fund, $600,000, FY 2007-08.
17. J. Qu (PI), P.J. Blau, W.H. Peter, J. Kiggans, "Low-cost, high-performance titanium brake rotors," ORNL MSTD Maturation Fund, $20,000, FY 2008.
18. G.M. Ludtka, J. Qu, "Improving enamel-based coatings," WFO with SSW Holding Co., $50,000, FY 2006-07.
19. C. Daniel, N.B. Dahotre, B.L. Armstrong, P.J. Blau, J. Qu, "Laser interference direct structuring of zirconia for dental materials," ORNL LDRD Seed Money Fund, $42,000, FY 2006-07.
20. J. Qu (PI), J.J. Truhan, S. Dai, H. Luo, P.J. Blau, "Ionic liquids as novel lubricants," ORNL LDRD Seed Money Fund, $145,000, FY 2005-06.
21. P.J. Blau, J. Qu (co-PI), J. Klett, "Investigation of tribological properties of graphitic foam reinforced carbon-carbon composites," ORNL LDRD Seed Money Fund, $20,000, FY 2003.

PATENTS

1. C. Higdon, A.A. Elmoursi, J. Goldsmith, B. Cook, P.J. Blau, J. Qu, R. Milner, "Ion beam sputter target and method of manufacture," U.S. Patent #8,821,701, August 13, 2014.

2. J. Qu, H.T. Lin, P.J. Blau, V.K. Sikka, "Titanium aluminide intermetallic alloys with improved wear resistance," U.S. Patent #8,771,439 B2, July 8, 2014.
3. J.A. Ambrose, G. Mackiewicz-Ludtka, V.K. Sikka, J. Qu, "Oven rack having integral lubricious, dry porcelain surface," US Patent #8,739,773 B2, June 3, 2014.
4. J. Qu, S. Dai, and H. Luo, "Method for synthesis of titanium dioxide nanotubes using ionic liquids," U.S. Patent #8,585,886, November 19, 2013.
5. J. Qu, J.J. Truhan, S. Dai, H. Luo, P.J. Blau, "Lubricants or lubricant additives composed of ionic liquids containing ammonium cations," U.S. Patent #7,754,664, July 13, 2010.
   - *The first granted U.S. patent in the topic of ionic liquid lubrication.*
6. J. Qu, H. Luo, Y. Zhou, J. Dyck, T. Graham, "Ionic liquids containing quaternary phosphonium cations and carboxylate anions, and their use as lubricant additives," U.S. Patent Application 14/444,029, Jul. 28, 2014.
7. J. Qu, H. Luo, "Ionic liquids containing symmetric quaternary phosphonium cations and phosphorus-containing anions, and their use as lubricant additives," U.S. Patent Application 14/184,754, Feb. 20, 2014.
8. J. Qu, H. Luo, "Corrosion prevention of magnesium surfaces via surface conversion treatments using ionic liquids," U.S. Patent Application 14/044,248, Oct. 2, 2013.
9. J. Qu, S. Dai, "Composite nanowire compositions and methods of synthesis," U.S. Patent Application 12/904,559, Oct. 14, 2010.
   - *Elected as one of the six top potential ORNL technologies for "Bridging the Gap 2011."*
10. J. Qu, T.M. Besmann, S. Dai, X. Zhang, "Multijunction hybrid solar cell incorporating vertically-aligned silicon nanowires with thin-films," U.S. Patent Application 12/907,476, Oct. 19, 2010.

PUBLICATIONS

Google Scholar citations: >1700, h-index: 24, i10: 42
https://scholar.google.com/citations?user=kC_r23MAAAAJ&hl=en

- **Book Chapters**
  1. J. Qu, Chapter 23 "Diesel Fuel Lubrication and Testing," in: S.C. Tung and G.E. Totten, eds. *Automotive Lubricants and Testing*, Eagan, MN, ASTM International, SAE International, 2012.
  2. J. Qu, H.M. Meyer, "X-Ray Photoelectron Spectroscopy," in: *Encyclopedia of Tribology*, Springer, 2013.
  3. A.H. Heuer, J. Qu, L. O'Donnell, "Low Temperature Carburization," in: *Encyclopedia of Tribology*, Springer, 2013.
- **ASTM International Standards**
  1. ASTM G181, "Standard Test Method for Conducting Friction Tests of Piston Ring and Cylinder Liner Materials Under Lubricated Conditions," *ASTM International*, 03.02 (2004).
  2. ASTM G206, "Guide for Measuring the Wear Volumes of Piston Ring Segments Run Against Flat Coupons in Reciprocating Wear Tests," *ASTM International*, 03.02 (2011).
- **Refereed Journal Papers** (*total 73, first or corresponding author* on 47*)
  1. J. Qu*, W.C. Barnhill, H. Luo, H.M. Meyer, D.N. Leonard, A.K. Landauer, B. Kheireddin, H. Gao, B.L. Papke, S. Dai, "Synergistic effects between phosphonium-alkylphosphate ionic liquids and ZDDP as lubricant additives," ***Advanced Materials*** 27 (2015) 4767-4774.
  2. J. Robinson, Y. Zhou, P. Bhattacharya, R. Erck, J. Qu, J. Bays, L. Cosimbescu, "Probing the molecular design of hyper-branched aryl polyesters towards lubricant applications," *Scientific Reports* 6 (2016) DOI:10.1038/srep18624.
  3. Y. Zhou, D.N. Leonard, H.M. Meyer, H. Luo, J. Qu*, "Does the use of diamond-like carbon coating and organophosphate lubricant additive together causes excessive tribochemical material removal?" *Advanced Materials Interfaces* 2 (2015) DOI: 10.1002/admi.201500213.

4. W.C. Barnhill, H. Gao, B. Kheireddin, B.L. Papke, H. Luo, B.H. West, J. Qu*, "Tribological bench and engine dynamometer tests of a low viscosity SAE 0W-16 engine oil using a combination of ionic liquid and ZDDP as anti-wear additives," *Frontiers in Mechanical Engineering* 1 (2015) 12, DOI: 10.3389/fmech.2015.00012.
5. W.F. Rohr, K. Nguyen, B.G. Bunting, J. Qu, "Feasibility of Observing Small Differences in Friction Mean Effective Pressure Between Different Lubricating Oil Formations using Small, Single-Cylinder Motored Engine Rig," *Tribology Transactions* 58 (2015) 1067–1075.
6. J. Qu*, H.M. Meyer III, Z.-B. Cai, C. Ma, H. Luo, "Characterization of ZDDP and ionic liquid tribofilms on non-metallic coatings providing insights of tribofilm formation mechanisms," *Wear* 332-333 (2015) 1273–1285.
7. Z.-B. Cai, Y. Zhou, J. Qu*, "Effect of oil temperature on tribological behavior of a lubricated steel−steel contact," *Wear* 332-333 (2015) 1158–1163.
8. W.C. Barnhill, J. Qu*, H. Luo, H.M. Meyer III, C. Ma, M. Chi, B.L. Papke, "Phosphonium-organophosphate ionic liquids as lubricant additives: effects of cation structure on physicochemical and tribological characteristics," *ACS Applied Materials & Interfaces* 6 (2014) 22585–22593.
9. Y. Zhou, J. Dyck, T. Graham, H. Luo, D.N. Leonard, J. Qu*, "Ionic liquids composed of phosphonium cations and organophosphate, carboxylate, and sulfonate as lubricant antiwear additives," *Langmuir* 30 (2014) 13301–13311.
10. Z.-B. Cai, H.M. Meyer III, C. Ma, M. Chi, H. Luo, J. Qu*, "Comparison of the tribological behavior of steel-steel and Si_3N_4-steel contacts in lubricants with ZDDP or ionic liquid," *Wear* 319 (2014) 172–183.
11. H.H. Elsentriecy, J. Qu*, H. Luo, H.M. Meyer III, C. Ma, M. Chi, "Improving corrosion resistance of AZ31B magnesium alloy via a conversion coating produced by a protic ammonium-phosphate ionic liquid," *Thin Solid Films* 568 (2014) 44–51.
12. H.H. Elsentriecy, H. Luo, H.M. Meyer III, L.L. Grado, J. Qu*, "Effects of pretreatment and process temperature of a conversion coating produced by an aprotic ammonium-phosphate ionic liquid on magnesium corrosion protection," *Electrochimica Acta* 123 (2014) 58–65.
13. J. Qu*, H. Luo, M. Chi, C. Ma, P.J. Blau, S. Dai, M.B. Viola, "Comparison of an oil-miscible ionic liquid and ZDDP as a lubricant anti-wear additive," *Tribology International* 71 (2014) 88–97.
14. W.D. Li, H. Bei, J. Qu, Y.F. Gao, "Effects of machine stiffness on the loading-displacement curve during spherical nano-indentation," *Journal of Materials Research* 28(14) (2013) 1903–1911.
15. G. Mordukhovich, J. Qu*, J.Y. Howe, S.S. Bair, B. Yu, H. Luo, D.J. Smolenski, P.J. Blau, B.G. Bunting, S. Dai, "A low-viscosity ionic liquid demonstrating superior lubricating performance from mixed to boundary lubrication," *Wear* 301 (2013) 740–746.
16. H. Li, S.K. Martha, R.R. Unocic, H. Luo, S. Dai, J. Qu*, "High cyclability of ionic liquid–produced TiO_2 nanotube arrays as an anode material for lithium-ion batteries," *Journal of Power Sources* 218 (2012) 88–92.
17. J. Qu*, D.G. Bansal, B. Yu, J. Howe, H. Luo, S. Dai, H. Li, P.J. Blau, B.G. Bunting, G. Mordukhovich, D.J. Smolenski, "Anti-wear performance and mechanism of an oil-miscible ionic liquid as a lubricant additive," *ACS Applied Materials & Interfaces 4* (2012) 997–1002.
– Invited candidature by the Scientific Secretariat for the ENI Award 2013.
18. B. Yu, D.G. Bansal, J. Qu*, X. Sun, H. Luo, S. Dai, P.J. Blau, B.G. Bunting, G. Mordukhovich, D.J. Smolenski, "Oil-miscible and non-corrosive phosphonium-based ionic liquids as candidate lubricant additives," *Wear* 289 (2012) 58–64.
19. J. Qu*, H. Li, J.J. Henry Jr., S.K. Martha, N.J. Dudney, H. Xu, M. Chi, M.J. Lance, S.M. Mahurin, T.M. Besmann, S. Dai, "Self-aligned Cu-Si core-shell nanowire array as a high-performance anode for Li-ion batteries," *Journal of Power Sources* 198 (2012) 312–317.

20. L. An, J. Qu, J. Luo, Y. Fan, L. Zhang, J. Liu, C. Xu, P.J. Blau, "Aluminum nanocomposites having wear resistance better than stainless steel," *Journal of Materials Research,* 26 (2011) 2479–2483.
21. C. Higdon, B. Cook, J. Harringa, A. Russell, J. Goldsmith, J. Qu, and P.J. Blau, "Friction and wear mechanisms in $AlMgB_{14}$-TiB_2 nanocoatings," *Wear* 271 (2011) 2111–2115.
22. J. Qu*, H. Xu, Z. Feng, D.A. Frederick, L. An, H. Heinrich, "Improving the tribological characteristics of aluminum alloys by forming a nanocomposite surface layer using friction stir processing," *Wear* 271 (2011) 1940–1945.
23. J. Qu*, H.M. Meyer III, P.J. Blau, B.G. Bunting, "Low-temperature colossal carbon supersaturation enables anti-wear boundary film formation for austenitic stainless steels in oil-lubricated environment," *Wear* 271 (2011) 1733–1738.
24. H. Li, J. Qu*, Q. Cui, H. Xu, H. Luo, M. Chi, R.A. Meisner, W. Wang, S. Dai, "TiO_2 nanotube arrays grown in ionic liquids: high-efficiencies in photocatalysis and pore-widening," *Journal of Materials Chemistry* 21(26) (2011) 9487–9490.
25. J. Qu*, M. Chi, H.M. Meyer III, P.J. Blau, S. Dai, H. Luo, "Nanostructure and composition of tribo-boundary films formed in ionic liquid lubrication," *Tribology Letters* 43(2) (2011) 205-211.
26. A.M. Kovalchenko, P.J. Blau, J. Qu, and S. Danyluk, "Scuffing initiation in metals sliding against copper under non-lubricated conditions," *Wear*, 271 (2011) 2998–3006.
27. B.A. Cook, J.L. Harringa, J. Anderegg, A.M. Russell, J. Qu, P. J. Blau, C. Higdon, A.A. Elmoursi, "Analysis of wear mechanisms in low friction, nanocomposite $AlMgB_{14}$-TiB_2 coatings," *Surface and Coatings Technology* 205(7) (2010) 2296-2301.
28. W. Li, P.J. Blau, J. Qu, S.J. Park, R.M. German, "Tribological behavior of die tool materials used for die compaction in powder metallurgy," *Powder Metallurgy* 53(3) (2010) 251-259.
29. F. Jiang, J. Qu, G. Fan, W. Jiang, D. Qiao, M.W. Freels, P.K. Liaw, H. Choo "Tribological studies of a Zr-based glass-forming alloy with different states," *Advanced Engineering Materials* 11(11) (2009) 925-931.
30. J. Qu*, P.J. Blau, S. Dai, H. Luo, H.M. Meyer III, "Ionic liquids as novel lubricants and additives for diesel engine applications," *Tribology Letters* 35(3) (2009) 181-189.
31. M. Beltowksi. P.J. Blau, J. Qu, "Wear of spheroidal graphite cast irons for tractor drive train components," *Wear* 267(9-10) (2009) 1752-1756.
32. H. Xu, C.R. Hubbard, K. An, Z. Feng, X.-L. Wang, J. Qu*, "Neutron diffraction measurement of residual stresses in friction stir processed nanocomposite surface layer," *Advanced Engineering Materials* 11(8) (2009) 650-653.
33. J. Qu*, P.J. Blau, S. Dai, H. Luo, H.M. Meyer III, J.J. Truhan, "Tribological characteristics of aluminum alloys against steel lubricated by imidazolium and ammonium ionic liquids," *Wear* 267(5-8) (2009) 1226-1231.
34. J. Qu*, P.J. Blau, B.C. Jolly, "Oxygen-diffused titanium as a candidate brake rotor material," *Wear* 267(5-8) (2009) 818-822.
35. P.J. Blau, M. Yao, J. Qu, J. Wu, "Use of multiple criteria to map the high-temperature scuffing behavior of Co-based superalloys," *Wear* 267(1-4) (2009) 374-379.
36. J. Qu*, H. Xu, Z. Feng, K. An, R. Battiste, L. An, H. Heinrich, "Forming Al-Al_2O_3 nanocomposite surfaces using friction stir processing," *Transactions of NAMRI/SME* 37 (2009) 349-356.
37. J. Qu*, P.J. Blau, J.Y. Howe, H.M. Meyer III, "Oxygen diffusion enables anti-wear boundary film formation on titanium surfaces in zinc-dialkyl-dithiophosphate (ZDDP)-containing lubricants," *Scripta Materialia* 60(10) (2009) 886-889.
38. J. Qu*, P.J. Blau, L. Zhang, H. Xu, "Effects of multiple treatments of low-temperature colossal supersaturation on tribological characteristics of austenitic stainless steels," *Wear* 265(11-12) (2008) 1909-1913.
39. J. Qu*, P.J. Blau, "A New model to calculate friction coefficients and shear stresses in thermal drilling," *ASME Journal of Manufacturing Science and Engineering* 130(1) (2008) 014502.

40. C.C. Klepper, J.M. Williams, J.J. Truhan, J. Qu, L. Riester, R.C. Hazelton, J.J. Moschella, P.J. Blau, J.P. Anderson, O.O. Popoola, M.D. Keitz, "Tribo-mechanical properties of thin boron coatings deposited on polished cobalt alloy surfaces for orthopedic applications," *Thin Solid Films* 516 (2008) 3070-3080.
41. T.W. Liao, F.M. Tang, J. Qu, P.J. Blau, "Grinding wheel condition monitoring with boosted minimum distance classifiers," *Mechanical Systems and Signal Processing* 22(1) (2008) 217-232.
42. J. Qu*, P.J. Blau, V.K. Sikka, "Measurement of the resistance of treated metal foils to scrubbing abrasion using a modified reciprocating wear test," *Journal of ASTM International* 4(8) (2007) Paper ID JAI101294.
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- **Conference Proceedings** (*available upon request*)

INVITED TALKS

1. "Ionic liquids as novel lubricant additives and their compatibility with other lubricant additives and non-ferrous materials," *2016 Tribology Gordon Research Conference*, Lewiston, ME, Jun. 26 – Jul. 1, 2016
2. "Oil-miscible ionic liquids as multi-functional additives for low-viscosity engine lubricants," *20th International Colloquium Tribology*, Stuttgart, Germany, Jan. 12-14, 2016.
3. "Using ionic liquids as anti-wear additives to lubricate non-metallic surfaces," *20th International Colloquium Tribology*, Stuttgart, Germany, Jan. 12-14, 2016.
4. "Low-viscosity lubricants using ionic liquids as base stocks or additives," Symposium on Molecular Chemistry and Lubricant Rheology, *STLE 70th Annual Meeting*, Dallas, TX, May 17-21, 2015.

5. "Oil-miscible ionic liquids as lubricant additives" in Panel Discussion: Ionic Liquids for Lubrication, *STLE 69th Annual Meeting*, Orlando, FL, May 18-22, 2014.
6. "Ionic Liquids as Next Generation Anti-wear Additives: Molecular Design to Engine Dynamometer Testing," *38th Automotive/Petroleum Industry Forum (Detroit Advisory Panel)*, Dearborn, MI, Apr. 16, 2014.
7. "Ionic Liquid-Additized Engine Oil for Improved Fuel Efficiency," *SAE 2014 High Efficiency IC Engine Symposium*, Detroit, MI, Apr. 6-7, 2014.
8. "Ionic liquids as novel lubricants or lubricant additives," *SAE 2012 High Efficiency IC Engines Symposium*, Detroit, MI, Apr. 22-23, 2012.
9. "Investigation of wear and surface damage on wind turbine bearing components" in Panel Discussion: U.S. DOE National Laboratory Research into Improvements in Reliability and Performance of Wind Turbine Drivetrains, *67th STLE Annual Meeting*, St. Louis, MO, May 6-10, 2012.
10. "Advanced surface treatments and coatings for improving tribological properties," Keynote Talk in Symposium for Hardfacing Coatings for Wear and Corrosion Resistance Applications, *Materials Science & Technology 2010 Conference*, Houston, TX, Oct. 17-21, 2010.
11. "Oxygen diffusion dramatically improves wear-resistance for titanium alloys," *Global Powertrain Congress - North America*, Chicago, IL, Oct. 14-15, 2008.
12. "Tribological properties of stainless steels treated by colossal carbon supersaturation," Keynote Talk in the Session of Surface Modifications and Coatings, *16th International Conference on Wear of Materials*, Montreal, Quebec, Canada, Apr. 15-19, 2007.
13. "Advanced low-friction high-wear-resistant lightweight materials," *Institute for Defense and Government Advancement (IDGA)'s 4th: Next Generation Materials for Defense Conference*, Arlington, VA, Feb. 28 - Mar. 1, 2006.
14. "An efficient method for determining wear volumes of sliders with non-flat wear scars" in Panel Discussion: Instrumentation and Techniques for Wear Measurement, *STLE 61st Annual Meeting*, Calgary, Alberta, Canada, May 7-11, 2006.