

Hong Guo

PhD Candidate in Engineering
Rochester Institute of Technology
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(a) EDUCATION

Rochester Institute of Technology, Rochester, NY

PhD in Engineering

09/2016 – Expected 05/2021

Jinan University, Guangzhou, China

M.S. in Functional Metal Materials

06/2014

Zhengzhou University, Zhengzhou, China

B.E. in Metal Materials and Engineering

07/2010

(b) RESEARCH EXPERIENCE

2016 – Present

Rochester Institute of Technology, Rochester, NY

Research Assistant and Teaching Assistant, Tribology Laboratory.

Research Title: *The Study of Lubrication Mechanism of Ionic Liquids.*

The focus of this project is to design, synthesize and characterize a series of novel environment-friendly protic ionic liquids (PILs). All of the PILs will be tested as neat lubricants and lubricant additives to provide a fundamental understanding of the relationship between the PIL structure and its physiochemistry properties and tribological performance.

Project: *Lubricating Ability of Magnesium Silicate Hydroxide-Based Nano-powder as Lubricant Additive in Steel-Steel and Ceramic-Steel Contacts.*

This study investigates the ability of Magnesium silicate hydroxide-based Nano-powder (KM) to reduce friction and improve the wear resistance of sliding steel surfaces. Optical microscopy, non-contact 3D profilometry, scanning electron microscopy, and energy-dispersive X-ray spectroscopy were used after the tribological tests to analyze and discuss the wear mechanisms and surface interactions.

2011 – 2014

Jinan University, Guangzhou, China

Research Assistant, China Foundry Industry Engineering Research Center for Wear Resistant Materials.

Thesis Project: *The Study of Microstructure, Hardness, Toughness and Wear Resistance of the Medium-carbon Low-alloy Steels with Nickel.*

Project: *Grain Refinement Effects of New Al-Ca-C Master Alloy on AZ91 Magnesium Alloy.*

2006 – 2010

Zhengzhou University, Zhengzhou, China

Research Assistant, College of Materials Science and Engineering.

Thesis Project: *The Study of Organization and Micro-hardness of Mg₁₈Zn₃Y (Mg 79%, Zn 18%, Y 3%, wt. %) in Different States.*

(c) SKILLSETS

Materials Science and Technology - Fundamentals of Materials Science, Engineering Materials, Biomaterials, Functional Materials, Abrasion-resistant Materials and Abrasion, Fundamentals of Heat Technology of Metal, Computational Chemistry, etc.

Materials performance testing - Optical microscope, Profilometry, XRD, NMR, FTIR, DSC, TGA, SEM, EDS, TEM, Raman Spectrometer etc.

Instrument operation - roller mill, tube furnace, resistance furnace, wire cutting machine, impact abrasive wear testing machine, pin-on-disk tribometer, ball-on-flat reciprocating tribometer, viscometer, etc.

Related Theories Reserve - General chemistry, organic chemistry, polymer chemistry, physical chemistry, physics, advanced mathematics, linear algebra, probability and statistics, etc.

Data Collection and Analysis - Software including Microsoft Word, Excel, PowerPoint, MATLAB, Origin, SOLIDWORKS, Ansys, Abaqus.

Program - C++, Python, Fortran.

(d) AWARDS

1. Gleason Doctoral Fellowship, 2017-2020, USA
2. The Best Oral Presentation (Graduate Showcase) in Rochester Institute of Technology, 2019, USA
3. Top Grade Scholarship of Jinan University in 2013, 2012, P.R.C
4. Third Grade Scholarship of Zhengzhou University in 2009, P.R.C
5. Excellent Student Cadre in Jinan University in 2013, P.R.C

(e.1) Journal Articles

- 1) **Hong Guo**, Fanghua Chen, Rui Liu, and Patricia Iglesias. Lubricating Ability of Magnesium Silicate Hydroxide-Based Nanopowder as Lubricant Additive in Steel-Steel and Ceramic-Steel Contacts. *Tribology Transaction*. 2020:1-12
- 2) **Hong Guo**, Junru Pang, Angela Rina Adukure, Patricia Iglesias. Influence of hydrogen bonding and ionicity of protic ionic liquids on lubricating steel-steel and steel-aluminum contacts: potential ecofriendly lubricants and additives. *Tribology Letters*. 2020 (Accepted)
- 3) J.L. Viesca, P. Oulego, R. González, **Hong Guo**, A. Hernández Battez, P. Iglesias. Miscibility, corrosión and environmental properties of six hexanoate- and sulfonate-based protic ionic liquids. *Journal of Molecular Liquids*. 2020 (Accepted)
- 4) **Hong Guo**, Thomas Smith, and Patricia Iglesias. The study of hexanoate-based protic ionic liquids used as lubricants in steel-steel contact. *Journal of Molecular Liquids*. 2019, 299:1-10.
- 5) **Hong Guo**, Angela Rina Adukure, Patricia Iglesias. Effect of Ionicity of Three Protic Ionic Liquids as Neat Lubricants and Lubricant Additives to a Biolubricant. *Coatings*. 2019, 9(11):713-728.
- 6) Leah Matczak, Cammie Johanning, Emmanuel Gil, **Hong Guo**, Thomas W. Smith, Michael Schertzer, and Patricia Iglesias. Effect of cation nature on the lubricating and physicochemical properties of three ionic liquids. *Tribology International*. 2018, 124:23-33.
- 7) Akshar Patel, **Hong Guo** and Patricia Iglesias. Study of the lubricating ability of protic ionic liquid on an aluminum-steel contact. *Lubricants*. 2018, 6(6):1-13.
- 8) **Hong Guo**, and Patricia Iglesias. Tribological behavior of ammonium-based protic ionic liquid as additive. *Friction*. Accepted.
- 9) **Hong Guo**, Ying Liu, Wei Li. The investigation of wear mechanism and material selection of bucket teeth on excavator. *Materials Review*. 2014,28(4):99-101.
- 10) **Hong Guo**, Ying Liu, Wei Li. Effect of Ni on microstructure, hardness and toughness of medium-carbon low-alloyed steels. *Hot Working Technology*. 2014, 43(10):207-210.
- 11) Xueyang Zhao, Ying Liu, Xue Li, **Hong Guo**, Yiwen Liu, Wei Li. Effects of tempering temperature on microstructure and properties of ZG35Cr2NiMoVTi steel. *Heat Treatment of Metals*. 2014, 39(9):28-31.
- 12) Ying Liu, **Hong Guo**, Wei Li. Grain refinement effects of new Al-Ca-C master alloy on AZ91 magnesium alloy. *Special Casting & Nonferrous Alloys*. 2012, 32(9):796-798.

(e.2) Peer-reviewed Conference Proceedings

- 1) **Hong Guo**, Rui Liu, Alfonso Fuentes-Aznar, and Patricia Iglesias. Friction and wear properties of halogen-free and halogen-containing ionic liquids used as neat lubricants, lubricant additives and thin lubricant layers. *Proceedings of ASME 2017 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*.
- 2) **Hong Guo**, Steven Keil, John Ackerman, Ivan Puchades, Brian Landi, and Patricia Iglesias. The effects of single-walled carbon nanotubes and ionic liquids in reduction of friction and wear. *Proceedings of the ASME 2018 International Mechanical Engineering Congress and Exposition*.
- 3) Sameer Magar, **Hong Guo**, and Patricia Iglesias. Estimation of energy conservation in internal combustion engine vehicles using ionic liquid as an additive. *Proceedings of the ASME 2018 International Mechanical Engineering Congress and Exposition*.

- 4) **Hong Guo**, and Patricia Iglesias. Tribological properties of ammonium protic ionic liquids as additives in polyalphaolefin for steel-steel contact. *Proceedings of the ASME 2019 International Mechanical Engineering Congress and Exposition*.
- 5) Sameer A. Magar, **Hong Guo**, and Patricia Iglesias. Ionic liquid as cutting fluid additive using minimum quantity lubricant (MQL) in titanium-ceramic contact. *Proceedings of the ASME 2019 International Mechanical Engineering Congress and Exposition*.

(e.3) Oral Presentations in Conferences

- 1) **Hong Guo** and Patricia Iglesias. Tribological Behavior of Ammonium-based Protic Ionic Liquids as Additives. *2018 Graduate Showcase at Rochester Institute of Technology*
- 2) **Hong Guo** and Patricia Iglesias. Investigation of Protic Ionic Liquids Used as Lubricants. *2019 STLE Tribology Frontiers Conference. October 22, 2019*
- 3) **Hong Guo** and Patricia Iglesias. The Study of Hexanoate-based Protic Ionic Liquids Used as Lubricants in Steel-steel Contact. *2019 Graduate Showcase at Rochester Institute of Technology*

(e.4) Poster Presentations in Conferences

- 1) **Hong Guo** and Patricia Iglesias. Investigation of ionic liquids as neat lubricants, additives of lubricants and thin-film lubricant layers. *21st International Conference on Wear of Materials. March 26-30, 2017*
- 2) Ryan Liu, Paarth Mehta, **Hong Guo**, Christopher Saldana and Patricia Iglesias. Tribological Properties of Textured Surfaces created using Modulation Assisted Machining for Steel-Aluminum Contact. *21st International Conference on Wear of Materials. March 26-30, 2017*
- 3) **Hong Guo** and Patricia Iglesias. Investigation of ionic liquids as neat lubricants, additives of lubricants and thin-film lubricant layers. *2017 Graduate Symposium and Showcase at Rochester Institute of Technology*

(e.5) Communication

The 13th National Conference on Wear-resisting Material, Xian, China, 11/2012.

(f) Other Activities

- Accepted interview - Getting in Gear: Research at RIT improves gear design, materials and manufacturing operations. - RIT news - 2020 (<https://www.rit.edu/news/getting-gear-research-rit-improves-gear-design-materials-and-manufacturing-operations>)
- Wrote article in magazine - Ionic Liquids: Advanced Lubricants and Lubricant Additives - Rochester Engineering Society - June 2020
- Served as reviewer - *ASME International Mechanical Engineering Conference & Exposition (IMECE)* - 2019
- Served as reviewer - Tribology International - 2020
- Served as reviewer - Bulletin of the Korean Chemical Society - 2020
- Co-organized lab activity for *WE're in Motion* and *ECCO Experience*- Summer 2019
- Organized activities to deliver knowledge about tribology to the public at *Imagine RIT 2018*
- Served as Co-Chair of Materials Processes and Characterization: *ASME International Mechanical Engineering Conference & Exposition (IMECE) 2018*
- Co-organized lab activity for K-12 Outreach Activity - 2017