

RESEARCH PORTFOLIO

Clemson University Department of Materials Science and Engineering

TABLE OF CONTENTS

John Ballato.....	3
Vincent Blouin	4
Rajendra Bordia	5
Kyle Brinkman.....	6
Phil Brown.....	7
Stephen Foulger.....	8
Kai He.....	9
Luiz Jacobsohn.....	10
Mark Johnson.....	11
M. Kennedy	12
Kostya Kornev	13
Olga Kuksenok	14
Igor Luzinov	15
Thompson Mefford.....	16
Fei Peng.....	17
Ulf D. Schiller	18
Ming Tang.....	19
Joshua Tong.....	20
Marek Urban	21

JOHN BALLATO cecas.clemson.edu/ballato

Materials Science and Engineering Department, Clemson University, Clemson, SC

Areas of Expertise –

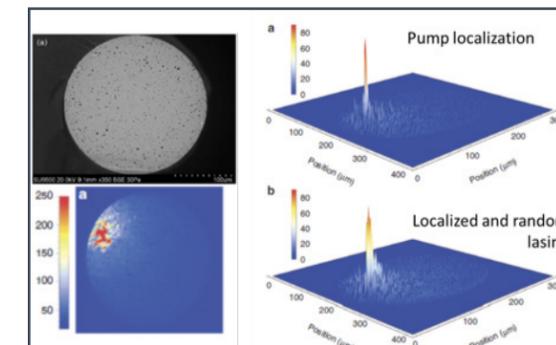
- Optical materials
- Glass
- (Real) fiber fabrication
- Lasers

Recent Projects –

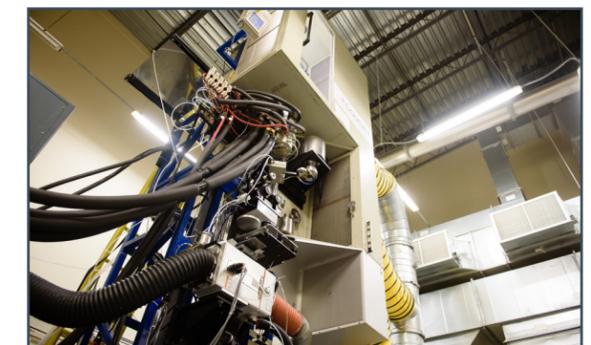
- DoD: A Unified Materials Approach to Mitigating Nonlinearities in HEL Optical Fibers
- DoD MURI: Internal Cooling of Fiber and Disc Lasers by Radiation Balancing and other Optical or Phonon Processes

Publications/Patents –

- “Materials for optical fiber lasers: A review,” Applied Physics Reviews 5, 041301 (2018); [invited review](#).
- “Laser restructuring and photoluminescence of glass-clad GaSb/Si-core optical fibres,” Nature Communications 10, 1790 (2019).
- “In-fiber silicon photonics,” Optics and Photonics News, pages 32 - 39, March 2019; [invited Feature Article](#).
- “Low-loss silicon core fibre platform for mid-infrared nonlinear photonics,” (Nature) Light: Science & Applications (in press, 2019).

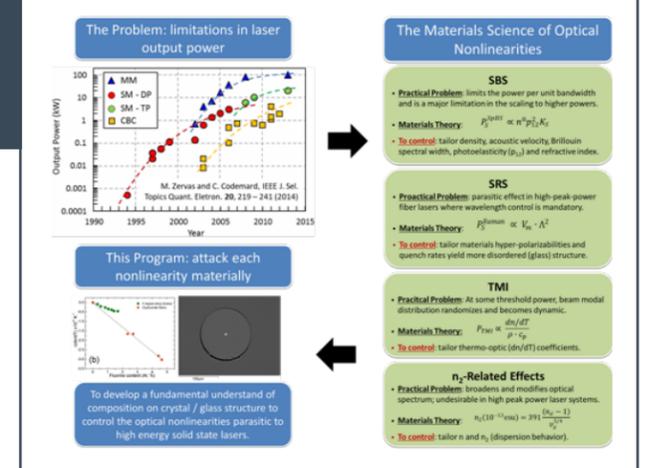


Novel fibers, fiber structures, and fiber materials e.g., Anderson localization; and random lasing.



Novel fibers, fiber structures, and fiber materials e.g., Semiconductors, in-fiber semiconductor structures

Materials science of optical nonlinearities
Leverage our Group's unique combination of expertise in optical materials science and fiber formation / engineering to address the biggest problems plaguing fiber laser systems through materials development.



VINCENT BLOUIN clemson.edu/cecas/departments/mse/people/faculty

Materials Science and Engineering Department, Clemson University, Clemson, SC

Areas of Expertise –

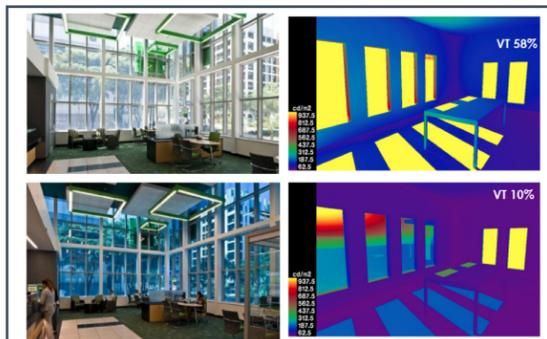
- Sustainability of the built environment
- Integration of smart materials and technologies in buildings

Recent Projects –

- Usability of electrochromic glazing in commercial buildings for visual comfort and energy consumption
- Thermodynamics of closed-loop geothermal system

Publications/Patents –

- G. Nikyema, V. Blouin, "Barriers to adoption of green building materials and technologies in developing countries: The case of Burkina Faso," SBE19, Thessaloniki, Oct. 2019.
- M. Hamidpour, V. Blouin, "Development of a Comparison-Based Control Strategy of Electrochromic Glazing for the Management of Indoor Lighting and Energy Efficiency," SimBuild, Chicago, Sept. 2018.
- N. Wonoto, V. Blouin, "Using Grounded Theory for the Development of a Structural Optimization Tool as a Form-Finding Method for Architectural Schematic Design," J. Arch. Eng. & Tech., Vol 7(1), 2018.
- D. Albright et al., *Building Framing System*, CURF, Patent No. US 1,156.67 B2, Dec. 2018



Electrochromic Glazing

Develop and test a new performance-based control strategy to optimize trade-off between visual comfort, energy consumption and usability.



Thermodynamics of Geothermal Systems

Numerical simulation and experimental testing of coaxial heat exchangers enhanced with turbulators (vortex generators).



Patented Building Construction System: Sim[PLY]

CNC-cut plywood assembled as 3D puzzle held in place with metal zip ties.

RAJENDRA BORDIA scepscoridea.org/MADEinSC/about_MADEinSC.html

Materials Science and Engineering Department, Clemson University, Clemson, SC

Areas of Expertise –

- Materials and Mechanics
- Microstructure Optimization
- Ceramics for Energy Conversion and Storage, and Extreme Environments

Recent Projects –

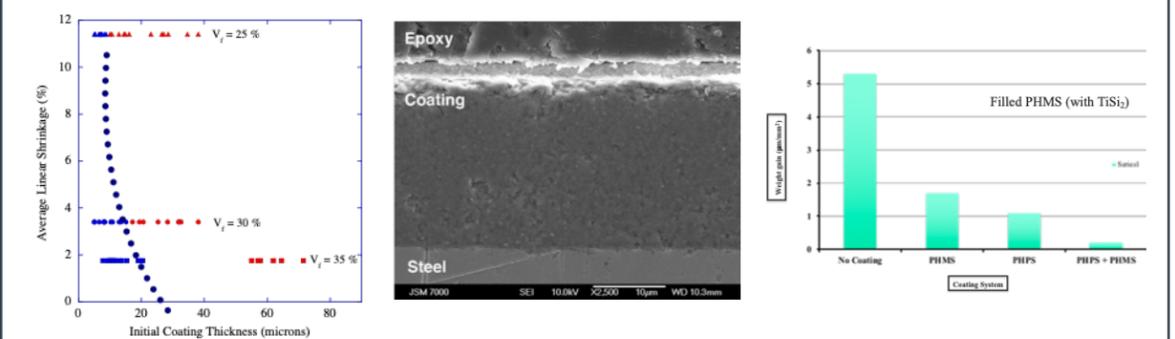
- NSF: Materials Assembly and Design Excellence in SC (MADE in SC) funded High Energy Density Li-ion Batteries
- DOE-NETL: Integrated TBC/EBC for SiC/SiC Composites
- NSF: Fundamental Investigation of Sintering Anisotropy

Publications/Patents –

- R.K. Bordia, S.-J.L. Kang, E.A. Olevsky J. of Am. Ceramic Society, 100, 2314 (2017).
- A. Lichtner, D. Roussel, D. Röhrens, D. Jauffres, J. Villanova, C.L. Martin, and R.K. Bordia Acta Mater., 155, 343 (2018).
- H. Shang, E.A. Olevsky, R.K. Bordia J. of Am. Ceramic Society, 102, 768 (2019).
- G. Barroso, Q. Li, R.K. Bordia, G. Motz J. of Materials Chemistry A, 7 (5), 1936 (2019).

Processing and Mechanics of Ceramic Coatings for Extreme Environment

Molecular precursor derived coatings for metals and ceramics



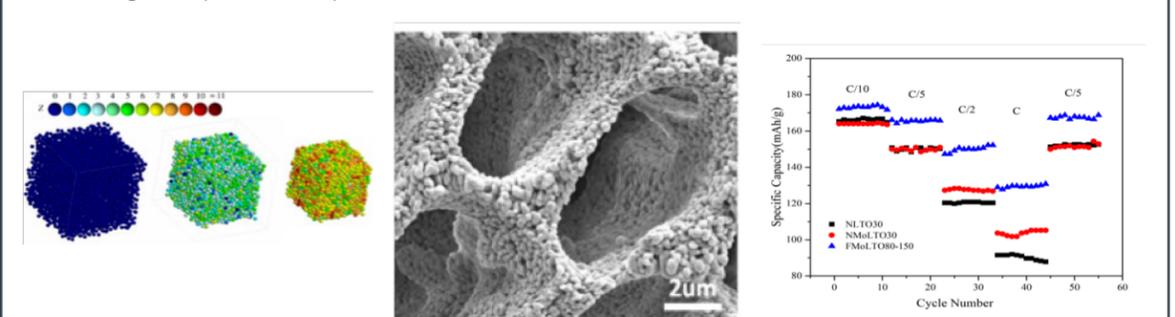
Calculated and experimentally verified critical coating thickness

Crack free polymer derived ceramic (PDC) coating on steel

Oxidation protection provided by PDC coatings

Porous Ceramics for Energy Conversion and Storage

Simulation guided optimization of porous ceramics for SOFCs and batteries



Simulation of sintering

Optimized hierarchical anisotropic porous ceramics

Higher capacity and capacity retention for optimized Li-ion battery electrodes

KYLE BRINKMAN cecas.clemson.edu/ceramicmaterials4energy

Materials Science and Engineering Department, Clemson University, Clemson, SC

Areas of Expertise –

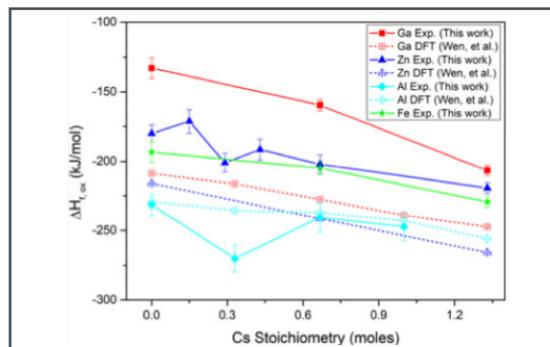
- Electrochemistry
- Ceramic Processing
- Nuclear Materials
- “Interface” between disciplines

Recent Projects –

- DOE-NEUP i) Crystalline Ceramic Waste Forms, ii) Tritium Management, using Proton Ceramic Membranes
- DOE-NETL: Proton Ceramics for Intermediate Temperature Fuel Cells

Publications/Patents –

- M.Zhao, Y. Xu, L. Shuller-Nickles, J.Amoroso, A.Frenkel, Y. Li, W. Gong, K.Lilova, A.Navrotsky, K.Brinkman Journal American Ceramic Society, 102 (7), 4314 (2019).
- R. Grote, M. Zhao, L. Shuller-Nickles, J. Amoroso, W. Gong, K. Lilova, A. Navrotsky, M. Tang, K.S. Brinkman, Journal of Materials Science, 54 (2), 1112, (2019).
- Y.Meng, L. Sun, W. Tan, C. Chen, J. Yi, H.J. M. Bouwmeester, Z Sun, J. Gao, K. Brinkman, ACS Applied Materials and Interfaces, 11, 11498, (2019).



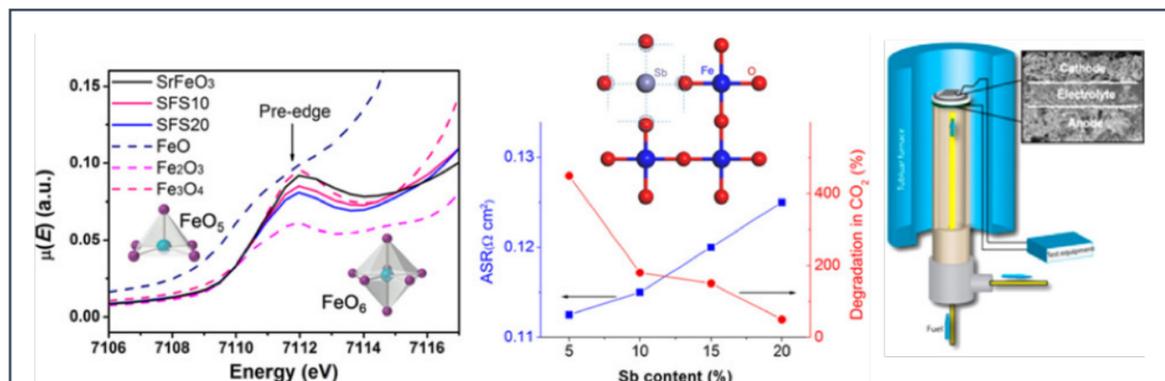
Thermodynamics

Experimental studies with implications on long term durability



Nuclear Material Waste Forms

Materials and processing



Fuel Cells, Solid State Batteries, and Membrane Separations

Solid state ionic conductor material and device development

PHIL BROWN cecas.clemson.edu/departments/mse/people/faculty

Materials Science and Engineering Department, Clemson University, Clemson, SC

Areas of Expertise –

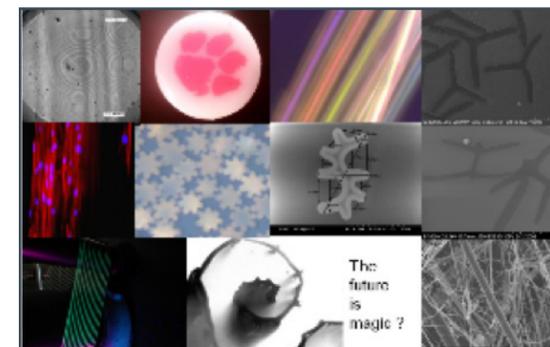
- Fiber production/characterization
- Polymer melt processing
- Polymer solution processing
- Multicomponent fiber materials

Recent Projects –

- ACRE i) Moisture and Ammonia Mitigation,
- Natick Army ii) Super-omniphobic textile surfaces

Publications/Patents –

- Bicomponent Fiber Extraction Process for Textile Applications, Philip Mooney, John Shearer, Joey Mead, Carol Barry, Quoc Truong, Elizabeth A. Welsh Richard Pang, Walter Zukas, Peter Stenhouse, Philip Brown, and Nicole Hoffman, Journal of Engineered Fibers and Fabrics Volume 3, Issue 1 – 2018.
- Tugba Demir,Liyong Wei,Naoki Nitta, Gleb Yushin, Philip J. Brown, and Igor Luzinov, Applied Materials and Interfaces, American Chemical Society, pp 24318-24330, 9, 2017.



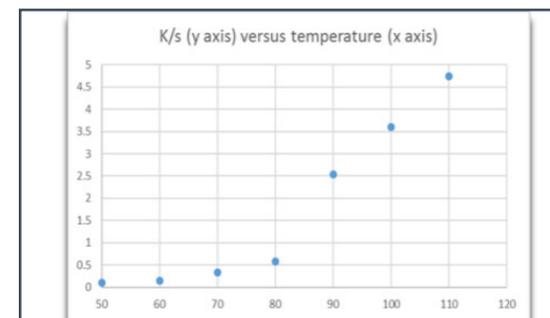
Fiber Fabrication

Production and characterization of complex fibers via melt extrusion, solution processing and multi-component spinning



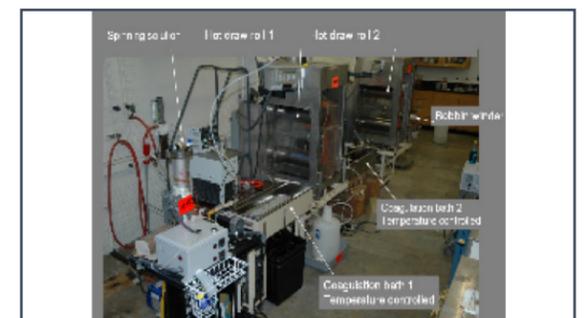
Fiber melt processing

Quadra multi-component system



Color Science

Dyeing transition temperature



Fiber solution processing

STEPHEN FOULGER tahoe.clemson.edu

Materials Science and Engineering Department, Clemson University, Clemson, SC

Areas of Expertise –

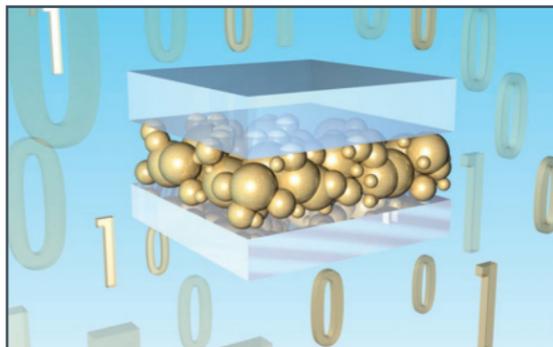
- Colloid Chemistry
- Polymer Chemistry
- Optoelectronic Devices
- Theranostic Colloids

Recent Projects –

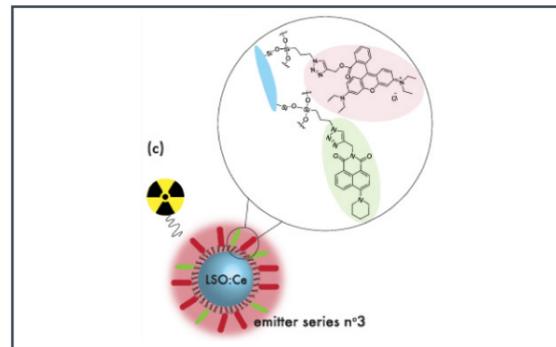
- NSF-DMR “Conductance Variability in Non-Conjugated Polymers: Memristors for Neuromorphic Applications”
- NSF-OIA “Track-II “RII Track-2 FEC: The Creation of Next-Generation Tools for Neuroscience - Noninvasive Radioluminescence Approaches to Optogenetics.”

Publications/Patents –

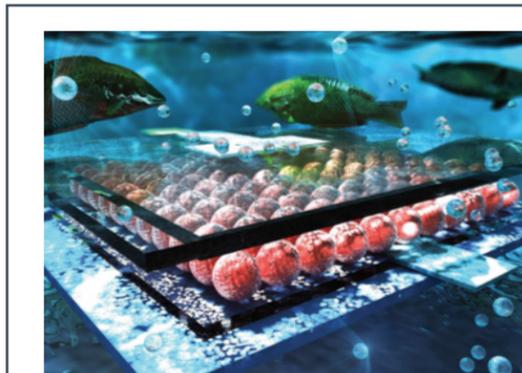
- Burdette, Bandera, Gray, and Foulger, “Dynamic Emission Tuning of X ray Radioluminescent Crystalline Colloidal Arrays: Coupling the Optical Stop Band with Sequential Förster Resonance Energy Transfers”, *Advanced Optical Materials*, 7, 1801142 (2019).
- Burdette, Bandera, Zhang, Trofimov, Dickey, Foulger, Kolis, Cannon, Bartley, Dobrunz, Bolding, McMahon, and Foulger, “Organic Fluorophore Coated Polycrystalline Ceramic LSO:Ce Scintillators for X-ray Bioimaging”, *Langmuir*, 35, 171-182 (2019).



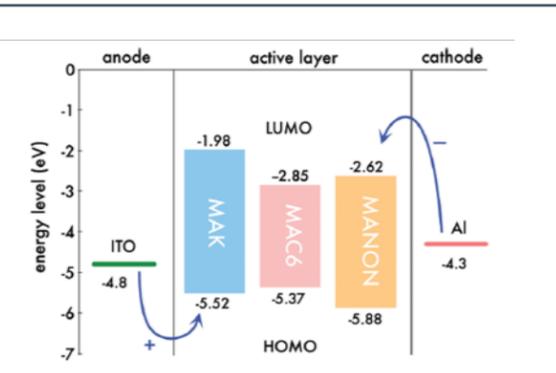
Organic Memristors
Colloid memristors for synaptic mimicry



Theranostic Colloids
X-ray nanoparticles for optogenetics



BioBased Printed Batteries, OLEDs, and Conductive Polymers
Multifunctional devices through polymer structure-property synthesis



KAI HE cecas.clemson.edu/helab/

Materials Science and Engineering Department, Clemson University, Clemson, SC

Areas of Expertise –

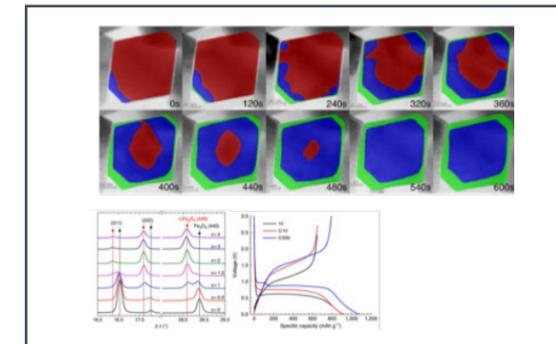
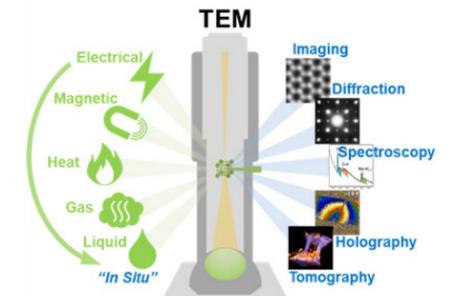
- Advanced Electron Microscopy
- Energy Conversion and Storage
- Multifunctional Nanomaterials
- Development of Methodologies and Instrumentation

Recent Projects –

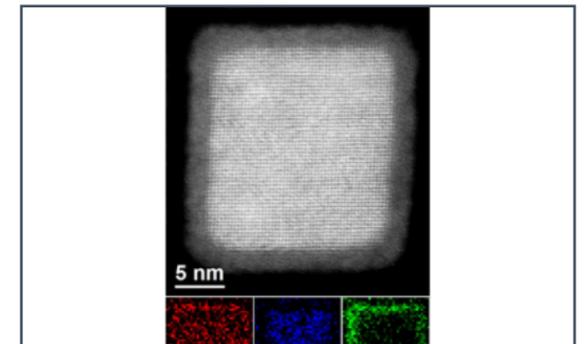
- CU-MRI: In situ TEM heating and biasing instrumentation
- CU-CIA: TEM characterization for functional ceramics

Publications/Patents –

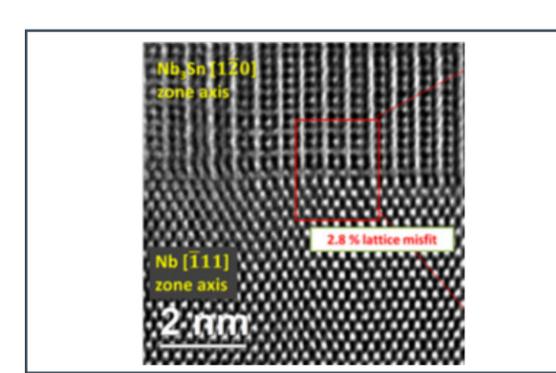
- S. Kim, Z. Yao, J. M. Lim, M. C. Hersam, C. Wolverton, V. P. Dravid, K. He*, *Advanced Materials*, 30, 1804925 (2018).
- J. Gao, Y. Meng, T. Hong, S. Kim, S. Lee, K. He, K. S. Brinkman, *Journal of Power Sources*, 418, 162 (2019).
- S. Kim, H. J. Jung, J. C. Kim, K.-S. Lee, S. S. Park, V. P. Dravid, Kai He*, H. Y. Jeong, *ACS Nano*, 12, 7335 (2018).
- S. Kim, G. Evmenenko, Y. Xu, D. B. Buchholz, M. Bedzyk, K. He, J. Wu, V. P. Dravid, *Advanced Functional Materials*, 1805723 (2018).



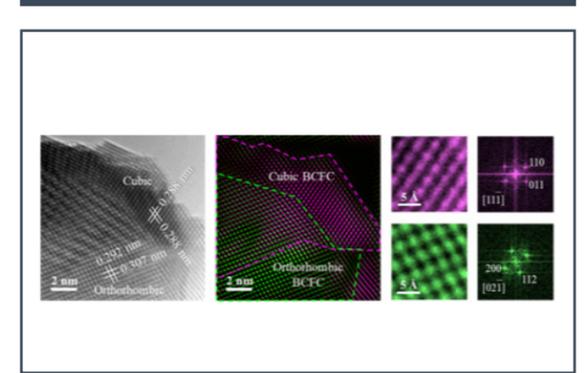
Rechargeable Batteries
Probe structural, chemical and phase evolutions during battery charge and discharge processes.
Nature Comm. 7, 11441, (2016)



Heterogeneous Catalysts
Design, synthesize and characterize the structure and chemistry of nanocrystals for applications in the emerging heterogeneous catalysts.
JACS. 137, 15074, (2015)



Structures and Interfaces
Understand micro-structures at the interfaces of multiphase materials and elucidate the “structure-property” relationship at atomic scale.
Supercond. Sci. Tech. 32, 024001 (2018)



Functional Ceramics
Develop novel functional ceramics for advanced ionic conducting electrolyte and electrode materials for next-generation solid-state batteries and fuel cells.

LUIZ JACOBSONH cecas.clemson.edu/scintillators

Materials Science and Engineering Department, Clemson University, Clemson, SC

Areas of Expertise –

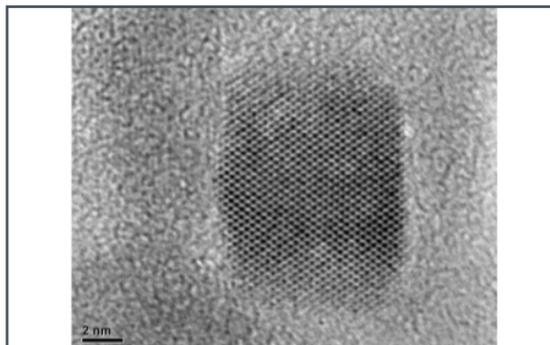
- Scintillators
- Luminescent Materials
- Optical Materials
- Synthesis, processing and characterization of ceramics

Recent Projects –

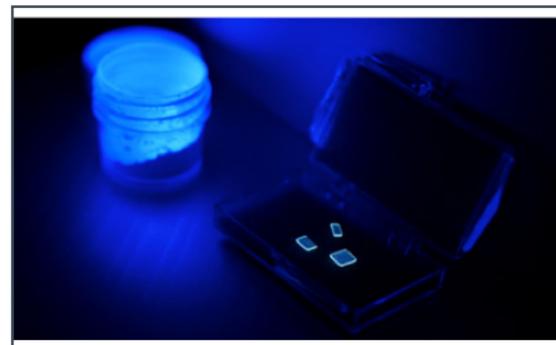
- NSF: CAREER - Towards Engineering Electronic Defects in Inorganic Luminescent Materials
- DTRA: Reactive Membranes for Rapid Isotopic Analyses of Waterborne Special Nuclear Material

Publications/Patents –

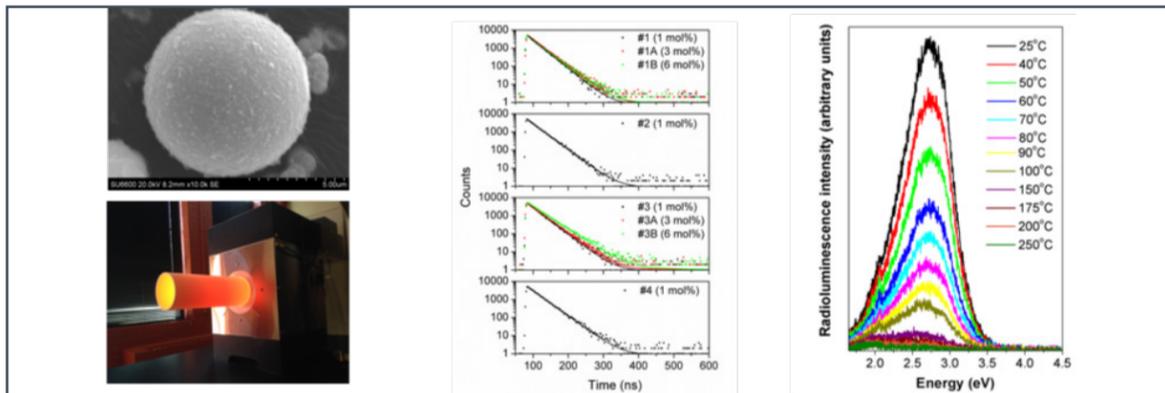
- M.G. Chapman, M.R. Marchewka, S.A. Roberts, J.M. Schmitt, C. McMillen, C.J. Kucera, T.A. DeVol, J. Ballato, and L.G. Jacobsohn, *Journal of Luminescence*, 165, 56-61 (2015).
- M.W. Kielty, L. Pan, M.A. Dettmann, V. Herrig, U. Akgun, and L.G. Jacobsohn, *Journal of Materials Science: Electronic Materials*, <https://doi.org/10.1007/s10854-019-01301-4> (2019).
- A.A. Trofimov, M.R. Marchewka, and L.G. Jacobsohn, *Radiation Measurements*, 122, 34-39 (2019).



Nanoparticles, Powders, Transparent Ceramics, Glasses
Variety of forms of luminescent materials



Scintillators, Dosimeters
Ionizing radiation interaction with matter
Photoluminescence, Lifetime, Radioluminescence, Thermoluminescence, OSL



Design, Synthesis, Processing and Characterization of Inorganic Luminescent Materials
Materials design and characterization

MARK JOHNSON researchgate.net/scientific-contributions/2056721905_Mark_Johnson

Materials Science and Engineering Department, Clemson University, Clemson, SC

Research Areas and Interests –

- Compound Semiconductor Materials & Devices:
 - Wide-Bandgap Materials and Structures
 - MBE and MOCVD Growth and Functional Processing
- Clean Energy Technologies:
 - Energy Storage (Stationary), Rare Earth Materials and System Enabling Material
- Advanced Manufacturing Technologies
 - Information Technology and SMART Manufacturing
 - AI/ML and HPC for Materials Manufacturing
- Technology Commercialization
 - Early-Stage Venture formation
- Science and Energy Related Public Policy

All of Clemson Effort: Research, Education and OutreachSouth Carolina State Appropriation (\$4M in FY20) –

- Education: AM Senior Experience at ICAR (Start with ME, plus CSC)
- Research: Matching Funds for Competitive Solicitations
- Outreach: Enhance Innovation Eco-System
- Partnerships: Workshops and Thought Leadership

Focus Areas

- Clemson Already Doing “Advanced Manufacturing” in >40 Groups, Labs, Centers and Institutes. Catalyze for Whole > Parts.
- Advanced Materials and their Manufacturing is High Opportunity

M. KENNEDY cecas.clemson.edu/kennedylab/Kennedy_Research_Group/Overview

Materials Science and Engineering Department, Clemson University, Clemson, SC

Areas of Expertise –

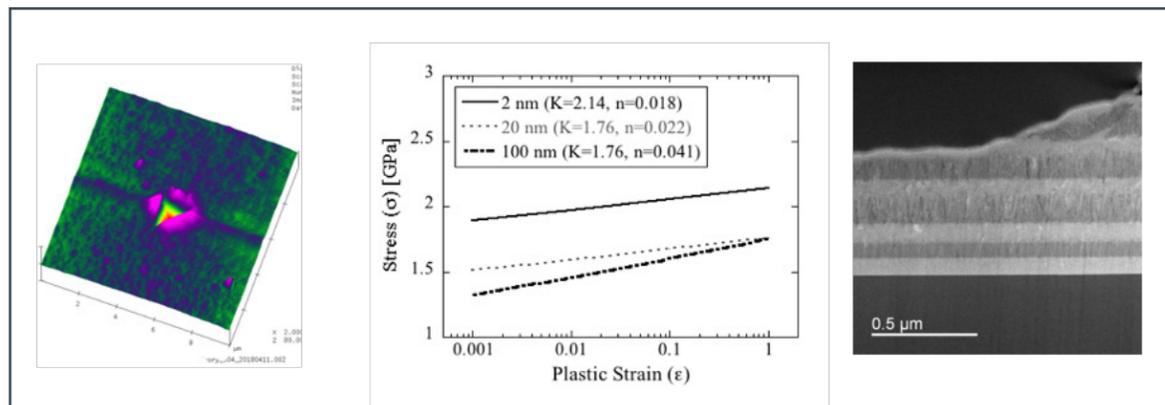
- Thin film mechanical behavior and tribology
- Engineering education: self-efficacy, undergraduate research

Recent Projects –

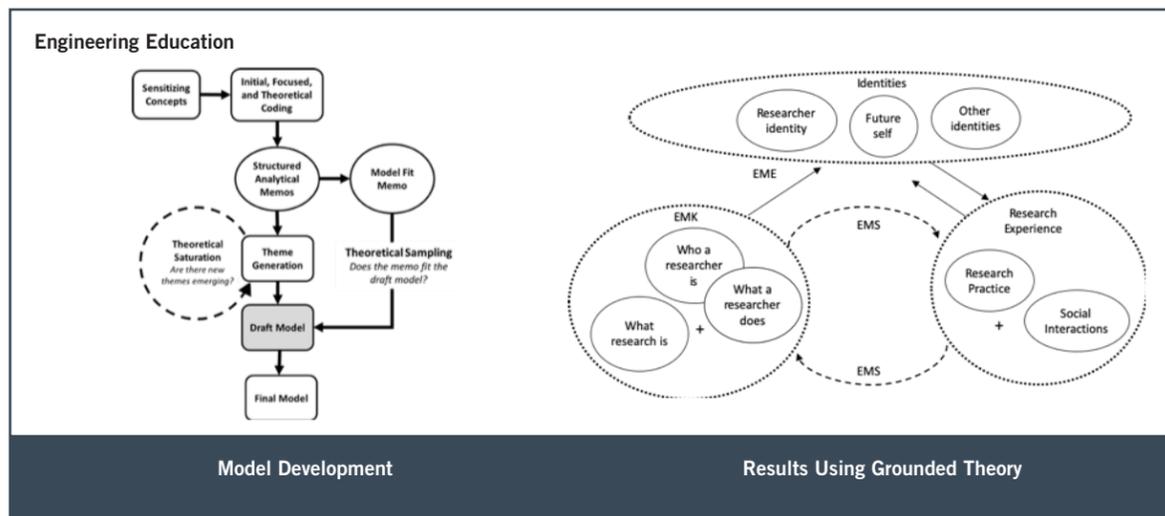
- NSF - Student Perspectives on Researcher Identity and Transformed Epistemologies
- DoD - Preventing Infection by Surface Modification of Orthopaedic Fracture Fixation Implants for Improved Limb Salvage Outcomes
- SRNL- Silicon Carbide Permeation

Publications/Patents –

- In-situ observations of the fracture and adhesion of Cu/Nb multilayers on polyimide substrates, M.J. Cordill et al, Materials Science and Engineering: A (2018).
- Electrochemical Behavior of Copper and Niobium Monolithic and Layered Thin Films, C. Sewell et al, CORROSION 2019 (2019).
- Dynamics of Researcher Identity and Epistemology: The Development of a Grounded-theory Model, ASEE (2019).



Role of Microstructure in Mechanical, Tribological and Fatigue Performance



KOSTYA KORNEV cecas.clemson.edu/kornevlab/

Materials Science and Engineering Department, Clemson University, Clemson, SC

Areas of Expertise –

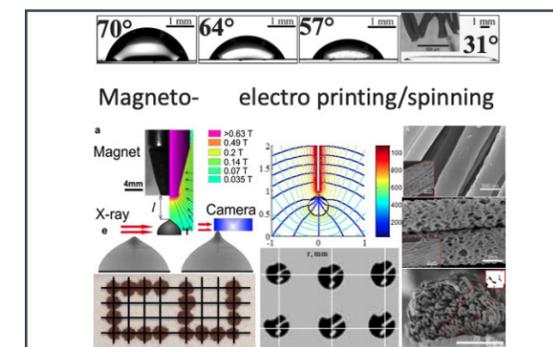
- Thermodynamics & continuum mechanics of materials
- Capillarity & wetting
- Magnetic colloids for analytics
- Nanomanufacturing in electric & magnetic fields
- Biomechanics of insects

Recent Projects –

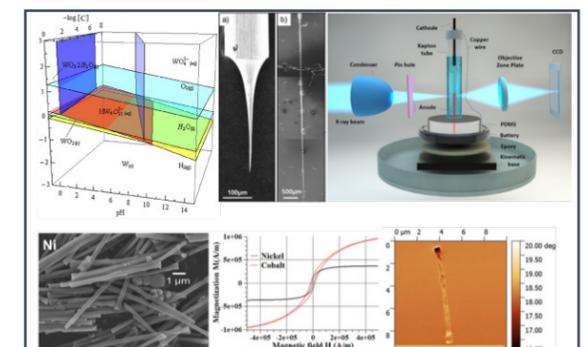
- National Science Foundation
- Air Force Research Laboratory
- NASA EPSCoR

Publications/Patents –

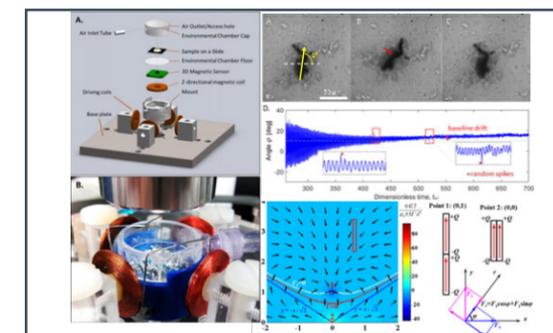
- Aprelev, P., Bruce, T.F., Beard, C.E., Adler, P.H., Kornev, K.G., Scientific Reports, 9, 3451(2019)
- Zhang, C. , Beard, C. E., Adler, P.H., Kornev, K.G., R. Soc. open



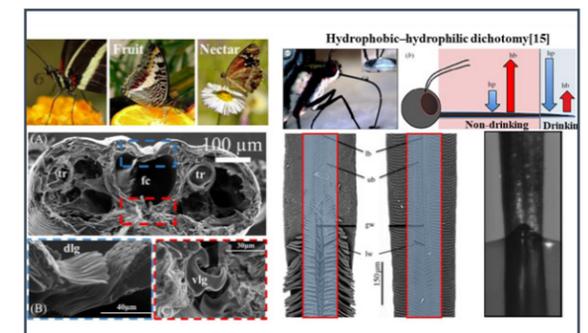
Capillarity & wetting
Materials science of coating, printing & adhesion



Theory and the real time X-ray nanotomography of electrochemical nanomanufacturing



Development of Magnetic Rotational Spectroscopy & magnonics



Insect materials & biomechanics
Materials science of natural multifunctional microfluidic complexly shaped fibers

OLGA KUKSENOK kuksenok.github.io/

Materials Science and Engineering Department, Clemson University, Clemson, SC

Areas of Expertise –

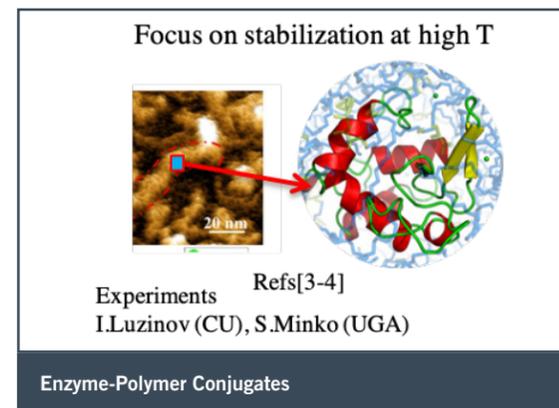
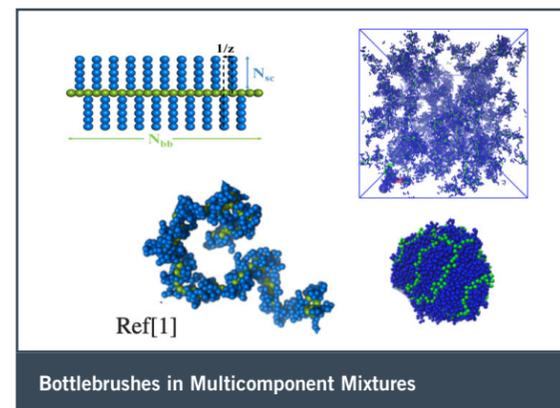
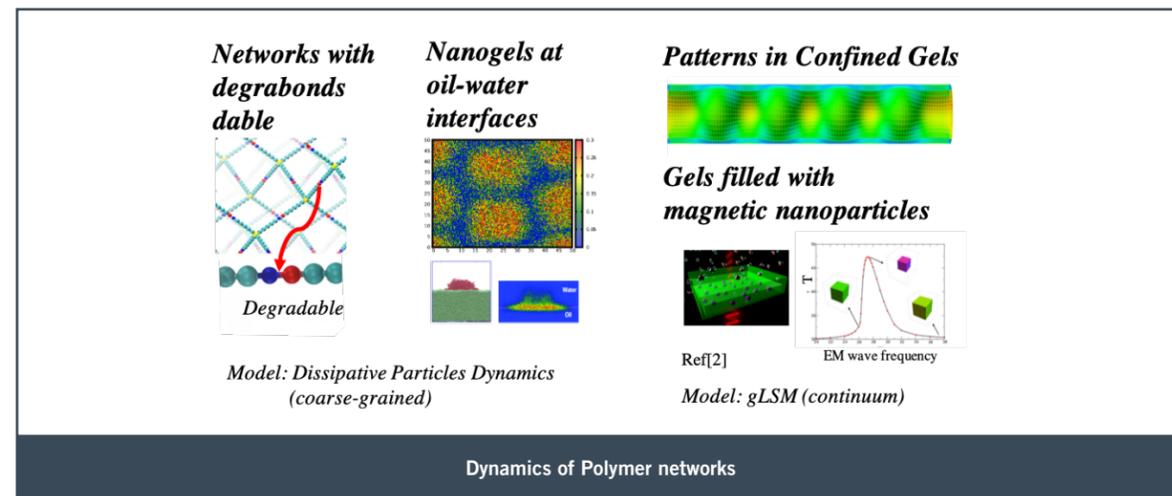
- Dynamics of responsive polymer gels
- Modeling of multicomponent polymer blends
- Pattern formation out-of-equilibrium

Recent Projects –

- ACS PRF “Multi-Scale Modeling of Dynamics of Polymer Gels in Oil-Water Mixtures”
- NSF MADE in SC EPSCoR, NSF Biophysics REU

Publications/Patents –

- [1] Tu, S., Choudhury, C. K., Luzinov, I., Kuksenok, O. “Recent advances towards applications of molecular bottlebrushes and their Conjugates”. *Current Opinion in Solid State and Materials Science* 23, 1, pp 50-61 (2019)
- [2] Savchak, O., Morrison, T., Kornev, K.G. and Kuksenok, O., Controlling deformations of gel-based composites by electromagnetic signals within the GHz frequency range. *Soft matter*, 14(43), pp.8698-8708 (2018)
- [3] Choudhury, C.K.; Tu, S.; Luzinov, I.; Minko, S.; Kuksenok, O. “Designing Highly Thermostable Lysozyme–Copolymer Conjugates: Focus on Effect of Polymer Concentration” *Biomacromolecules* 19 (4), 1175-1188 (2018)
- [4] Yadavalli NS, Borodinov N, Choudhury CK, Quiñones-Ruiz T, Laradji, Tu S., Lednev IK, Kuksenok O, Luzinov I, Minko S. “Thermal Stabilization of Enzymes with Molecular Brushes”, *ACS Catalysis*, 7 (12) 8675-8684 (2017)



IGOR LUZINOV clemson.edu/cecas/departments/mse/people/faculty

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Areas of Expertise –

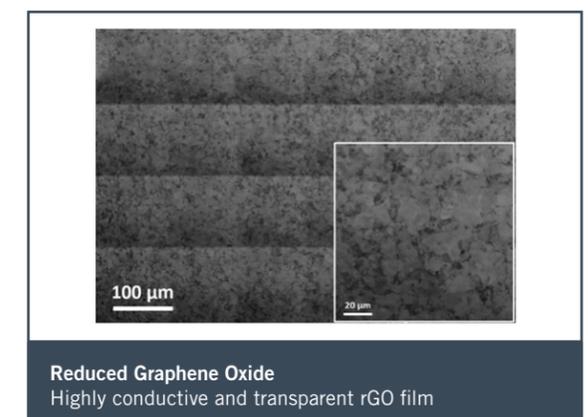
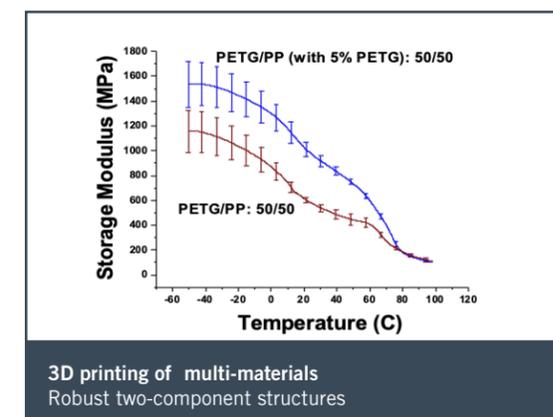
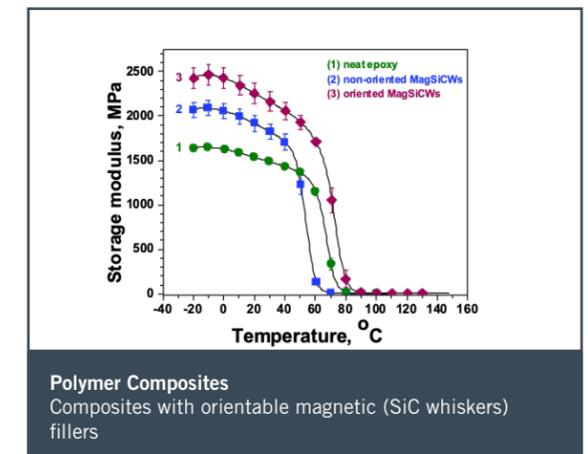
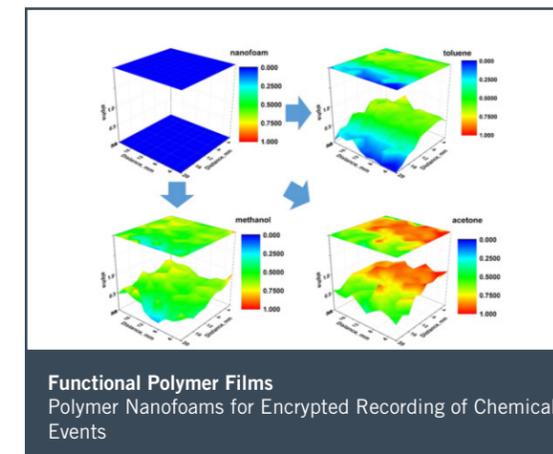
- Polymers and composites
- Thin films and coatings
- Fibrous materials
- Interfaces and adhesion
- 3D printing

Recent Projects –

- NSF CMMI: Highly Conductive Reduced Graphene Oxide Films for High Performance Electronic Devices
- DECAF Inc. : Molecularly Imprinted Fibers for Decaffeination.

Publications/Patents –

- Van Tooren, M., Luzinov, I. US Patent 10,240,012, March 26, 2019.
- Saychak, M Luzinov, I. et al, *ACS Appl. Materials & Interfaces* 2018, 10 (4), 3975.
- Wei, L. Y.; Luzinov, I. Et al. *Langmuir* 2018, 34, 12934.
- Townsend, J.; Luzinov, I. et al. *ACS Appl. Materials & Interfaces* 2017, 9 (27), 22927.
- Borodinov, N.; Luzinov, I. et al. *ACS Nano* 2016, 10 (12), 10716.



THOMPSON MEFFORD meffordresearch.com

Materials Science and Engineering Department, Clemson University, Clemson, SC

Areas of Expertise –

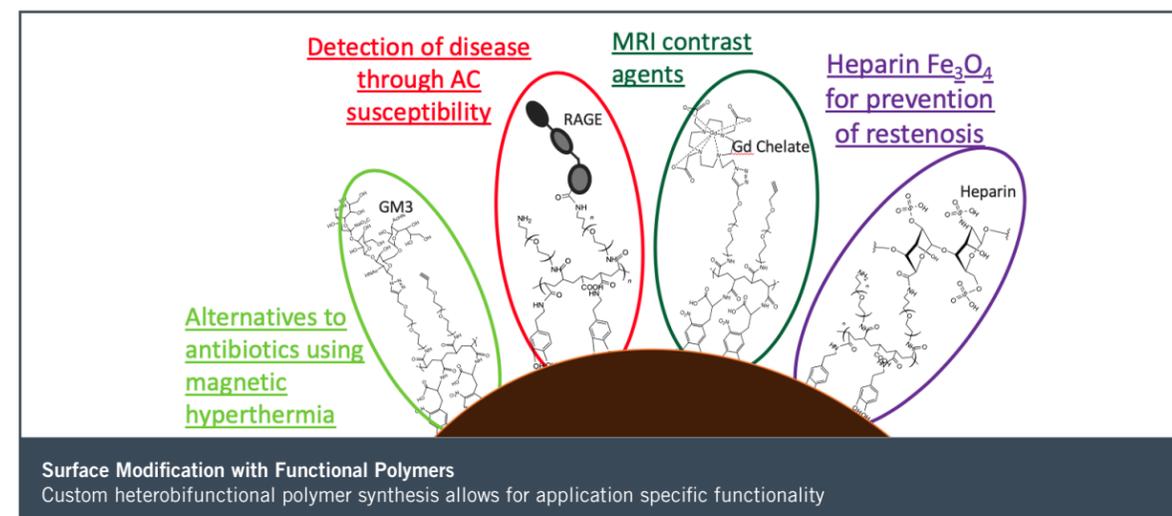
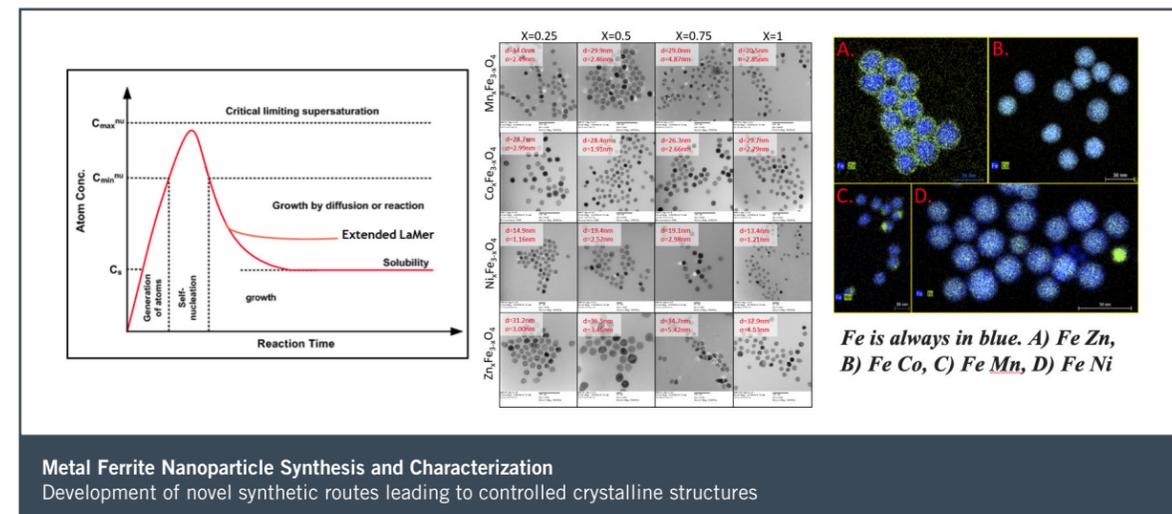
- Nanoparticle Synthesis
- Polymer Synthesis
- Magnetic Materials
- Biomaterials
- Surface Chemistry

Recent Projects –

- MRI contrast agents to measure mild traumatic brain injuries
- Selective binding/inactivation of target pathogen *Neisseria gonorrhoeae*

Publications/Patents –

- Fellows, Benjamin D., et al. "In vitro studies of heparin-coated magnetic nanoparticles for use in the treatment of neointimal hyperplasia." *Nanomedicine: Nanotechnology, Biology and Medicine* 14.4 (2018): 1191-1200
- Davis, Kathleen, et al. "The effect of post-synthesis aging on the ligand exchange activity of iron oxide nanoparticles." *Journal of colloid and interface science* 511 (2018): 374-382.
- Andrew, Jennifer S. et al. "Synthesis and Surface Functionalization of Ferrite Nanoparticles." *Nanomagnetic Actuation in Biomedicine*. CRC Press, 2018. 9-40



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Areas of Expertise –

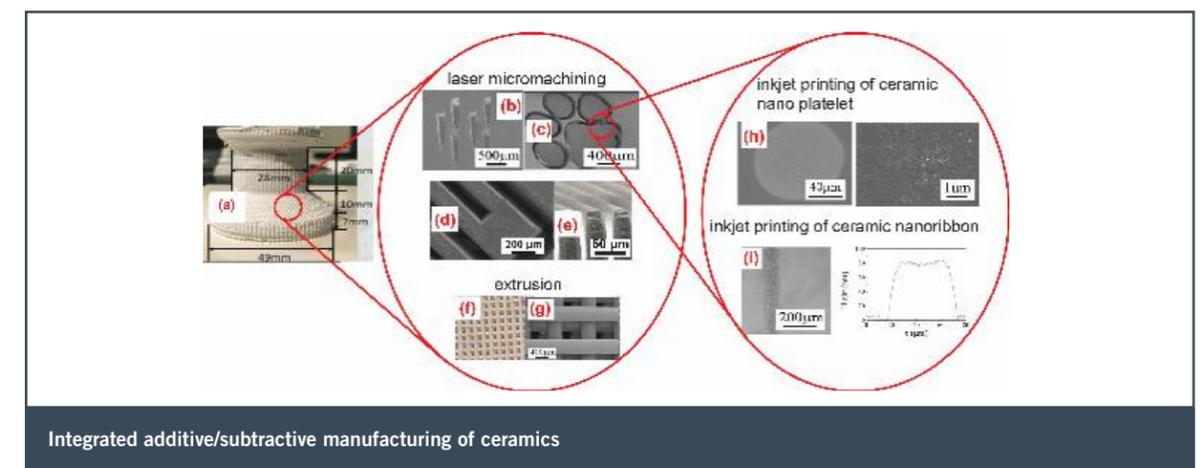
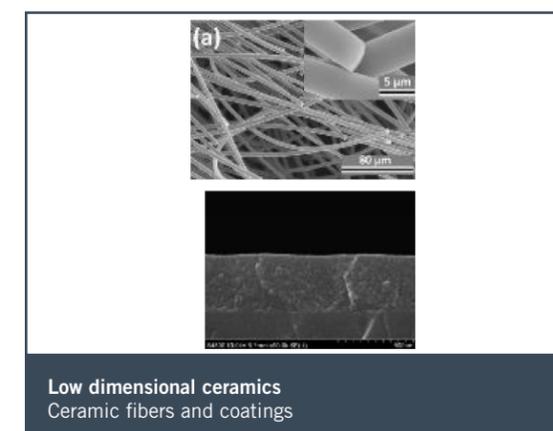
- Sol-gel processing
- Laser sintering of ceramics
- Integrated additive/subtractive manufacturing
- Nuclear Materials

Recent Projects –

- NIH-COBRE: in vivo characterization of contact stress distribution in hip replacement.
- BWXT/NASA: Fabrication of uranium nitride microspheres.
- DoE-NETL: Integrated TBC/EBC for SiC Fiber Reinforced SiC Matrix Composites for Next Generation Gas Turbines.
- DoE-EERE: Additive manufacturing of proton electrolyzer.

Publications/Patents –

- Lei, Jincheng, et al. "The effect of laser sintering on the microstructure, relative density, and cracking of sol-gel derived silica thin films." *Journal of the American Ceramic Society*. <https://doi.org/10.1111/jace.16640>
- Hong, Yuzhe, et al. "Fabricating ceramics with embedded microchannels using an integrated additive manufacturing and laser machining method." *Journal of the American Ceramic Society* 102.3 (2019): 1071-1082.



ULF D. SCHILLER clemson.edu/cecas/departments/mse/people/faculty

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Areas of Expertise –

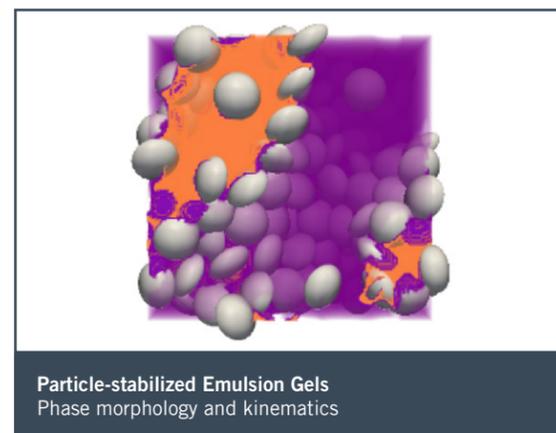
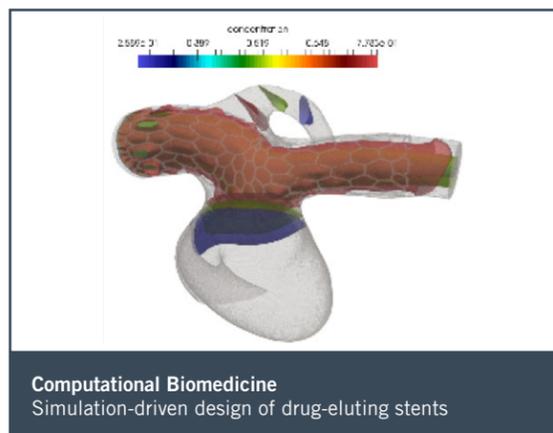
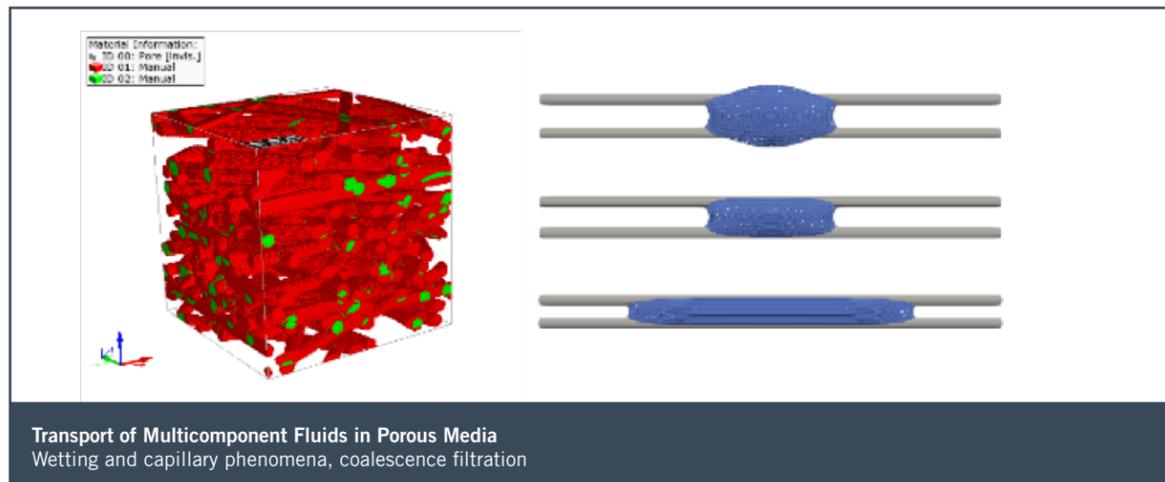
- Computational and Data-enabled Materials Science
- Multiscale Modeling of Soft Matter and Complex Fluids
- High Performance Computing

Recent Collaborations –

- MADE in SC: i) Coalescence Filtration in Porous Media, ii) Electrochemical Transport in Porous Electrodes
- Prisma Health: Patient-specific modeling of hepatic blood flow for noninvasive prediction of portal pressure

Publications –

- Schiller, U.D., Kuksenok, O., In Reviews in Computational Chemistry, Volume 31, pp. 1–61, Wiley (2018).
- Schiller, U.D., Wang, F., MRS Commun. 8, 358–371 (2018).
- Groen, D., Richardson, R.A., Coy, R., Schiller, U.D., Chandrashekar, H., Robertson, F., Coveney, P.V., Front. Physiol. 9, 721 (2018).
- Schiller, U.D., Krüger, T., Henrich, O., Soft Matter 14, 9–26 (2017).



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Areas of Expertise –

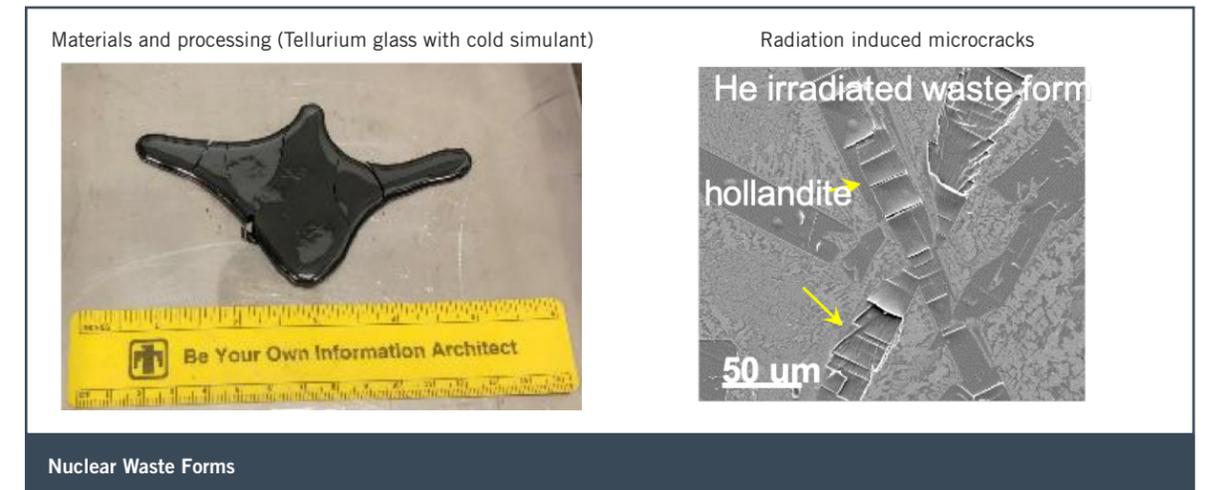
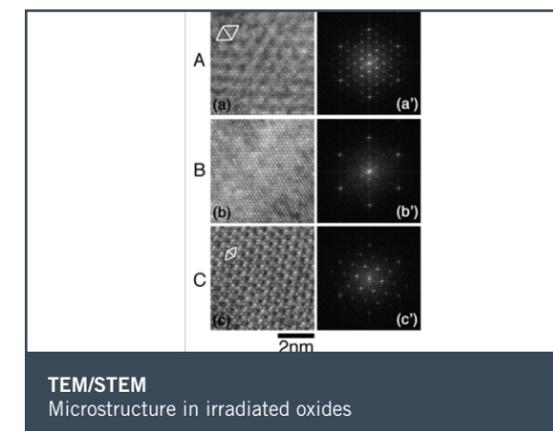
- Structure/Property
- Radiation Damage
- Nuclear Energy Materials
- Electron Microscopy

Recent Projects –

- DOE-NE-FCT: Glass Ceramic/Crystalline Ceramic Waste Forms
- DOE-EM-WRPS: Low-Temperature Glass Waste Forms for Tc-99
- DOE-BES: Relationship between Defects Kinetics & Crystalline Disorder

Publications/Patents –

- C. Kreller, J. Valdez, T. Holesinger, Y. Wang, M.Tang, F.Garzon, R. Mukundan, B.Uberuaga, “Massively enhanced ionic transport in irradiated crystalline pyrochlore”, Journal of Materials Chemistry A, 7 (2019) 3917.
- Y. Zhou, S. Li, M. Tang, L. Yan, “One-step Ion Beam Irradiation Manufacture of 3D Micro/Nanopatterned Structures in SiC Materials with Tunable Work Functions”, Carbon, 148 (2019) 387.
- B. Clark, S.K. Sundaram, J. Amoroso, J. Marra, M. Tang, “Radiation damage of hollandite in multiphase ceramic waste forms”, Journal of Nuclear Materials, 494 (2017) 61.



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Areas of Expertise –

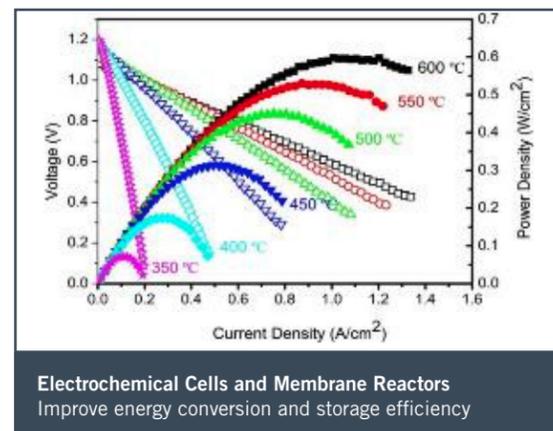
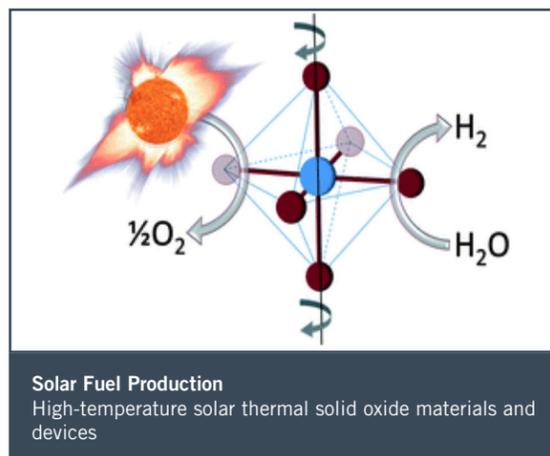
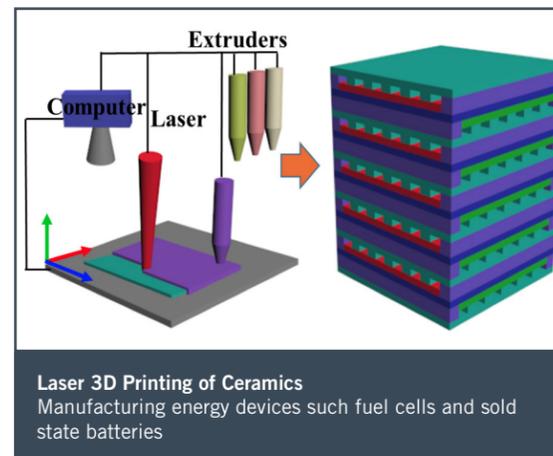
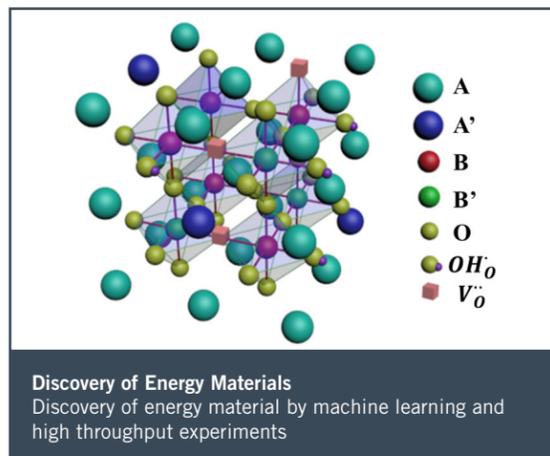
- Energy Materials and Devices
- Electrochemical Cells and Membrane Reactors
- Solar Fuel Production
- 3D Printing and Laser Processing of Ceramics

Recent Projects –

- DOE-EERE: Laser 3D printing of protonic ceramic electrolyzer stack
- ACS-PRF: Co-production of ammonia and ethene from natural gas
- DOE-ORNL: Go! Program

Publications/Patents –

- C. Duan, J. Tong, M. Shang, S. Nikodemski, M. Sanders, S. Ricote, A. Almansoori, R. O'Hayre, *Science*, 2015, 249, 1321.
- D.R. Barcellos, M.D. Sanders, J. Tong, A.H. McDaniel, R. P O'Hayre, *Energy & Environmental Science*, 2018, 11, 3256.
- S. Mu, Z. Zhao, J. Lei, Y. Hong, T. Hong, D. Jiang, Y. Song, W. Jackson, K.S. Brinkman, F. Peng, H. Xiao, J. Tong, *Solid State Ionics*, 2018, 320, 369.
- D. Jiang, Z. Zhao, S. Mu, V. Phaneuf, J. Tong, *International journal of Hydrogen Energy*, 2019, 44, 18360.



MAREK URBAN cecas.clemson.edu/urbanresearch

Materials Science and Engineering Department, Clemson University, Clemson, SC

Areas of Expertise –

- Polymer Science
- Polymer Synthesis; Polymerization
- Stimuli-Responsive Polymers
- Self-Healing Commodity Polymers
- Polymer Spectroscopy/Chemical Imaging

Recent Projects –

- DMR NSF Self-Healing Copolymers
- DOE Humidity-Responsive Polymers
- NSF IUCRC Self-Healing Copolymers
- NSF EPSCoR Stimuli-Responsive Copolymers

Publications/Patents –

- M.W. Urban, et al, Key-and-Lock Self-Healing Commodity Copolymers, *Science*, 2018, .
- C. Hornat, Y. Yang, D. Davidovich, *Advanced Materials*, 1603334, 29, 2017.
- Y. Yang, D. Davidovich, C.C. Hornat, X. Liu, M.W. Urban, *CHEM*, 2018, 4(8), 1928-36
- S. Wang, M.W. Urban, *Advanced Materials Reviews*, 2019, in press.
- M.W. Urban, *Stimuli-Responsive Materials*, Royal Society of Chemistry, UK, 2016 (ISBN: 978-1-84973-656-5; 978-1-78801-809-8)
- Journal of Nuclear Materials*, 494 (2017) 61.

Science, 2018, 362, 220; *Science*, 2009, 323, 1458; *CHEM*, 2018, 4(8), 1928; *Adv. Mater.*, 2017, 29, 1603334 ; *J. Mater. Chem.*, 2011, 21, 14473; *Angew. Chem. Int. Ed.*, 2014, 53, 12142; *Polym. Chem.*, 2017, 8, 303; *Nature Chem.*, 2012, 4, 80-82.

