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I. HONORS AND AWARDS

- ASME Fellow (2022)
- Nanomaterials and Energy Award—Institution of Civil Engineers, UK (2021)
- Frankenhoff Award for Excellence in Research—highest award at Kansas State University (2021)
- College of Engineering Dean's Award of Excellence in Research (2020)
- NSF PIRE (2018-2023)
- NSF CAREER (2015-2020)
- NSF EPSCoR First Award (2011-2012)
- Associate Editor of The Journal of the American Ceramic Society (2020-)
- Invited Speaker at NSF CAREER workshop 2015 and 2018
- Chairman, Editorial Board, American Ceramic Society Bulletin (2017-2018)
- Kansas State University Research Proposal Teamwork Award 2015
- Associate Editor of Nanomaterials and Energy Journal (2011-2012)
- NSF-Summer Institute Energy Manufacturing Fellowship 2011
- Big-XII Universities Faculty Fellowship (2010-2011)
- Elected full member of Sigma Xi, the Scientific Research Society 2009

II. SERVICE TO THE ENGINEERING PROFESSION (SYNERGISTIC ACTIVITIES)

- **Associate Editor (2020-):** The Journal of the American Ceramic Society
- **Faculty Advisor Society of Women Engineers (SWE), Kansas State University (2019-)**
- **Chairman the Editorial Board (Oct. 2017-Oct. 2018):** The American Ceramic Society Bulletin
- **Member of the Editorial Board (Oct. 2015-Oct. 2018):** The American Ceramic Society Bulletin
- **Member of the Editorial Board (2013-present):** Nature-Scientific Reports Journal (Impact Factor: 5.078)
- **Member of the Editorial Board (Sept. 2015-):** Nanomaterials and Nanotechnology Journal (IF: 1.129)
- **Associate Editor (2011-2012):** 'Nanomaterials and Energy' Journal (Institution of Civil Engineers, UK)
- **Founding Chair of Polymer Derived Ceramics Technical Interest Group at the American Ceramic Society (2015-):** Link: <http://ceramics.org/technical-interest-groups/from-molecules-to-manufacturing-products-arising-from-polymer-derived-ceramics>
- **Proposal Reviewer and Panelist**
 - Army Research Office (Fall 2021)
 - Dutch Research Council (NWO) (2021)
 - International Space Station U.S. National laboratory user proposal (2021)
 - South Carolina NSF EPSCoR (2021)
 - AFOSR Young Investigator Program (2021)
 - Army Research Office (Summer 2021)
 - NSF-DMR-CAREER (2021)
 - AFOSR Young Investigator Program (2020)
 - Russische Föderation-RFBR-DFG 2020--Deutsche Forschungsgemeinschaft (German Research Foundation) (2020)

- Israeli Ministry of Science Technology (MOST) as part of the framework of the "Advanced materials for next gen solar energy utilization and energy storage" (2020)
 - NSF-CMMI-CAREER (2019)
 - NSF-DMR-CAREER (2019)
 - NSF-CBET-TTP (2019)
 - NSF-DMR (2018)
 - NSF-DMR-CAREER (2017)
 - NSF-CMMI-MEP (2016),
 - NSF-Chemistry-CAREER (2016)
 - NSF-DMR-CAREER (2016)
 - NSF-CMMI-Nanomanufacturing (2014, 2015 & 2016)
 - NSF-DMR-Ceramics (Jan 2014, April 2015, December 2015, February 2016, August 2018)
 - NSF-CBET (March 2014)
 - NSF-CMMI-Materials Processing and Manufacturing Program (May 2012)
 - NSF-CMMI-Mechanics of Materials Program (April 2011)
 - NSF-CMMI-Materials Processing and Manufacturing Program (May 2011)
 - German Academic Exchange Service (DAAD) EU/COFUND-Programme P.R.I.M.E. (2017)
 - DFG, German Research Foundation (2017)
 - Ontario Research Fund, Ministry of Research and Innovation (2016)
 - National Science Centre, Poland (2017)
 - Ministry of National Education and Scientific Research, Romania (2016)
 - New York University-Abu Dhabi, UAE (2015)
 - American Chemical Society-Petroleum Research Fund (2015)
 - Canada Foundation for Innovation (August 2014)
 - United States-Department of Energy-SBIR (2010)
- **Tenure Packet Reviewer**
 - Associate Professor: Department of Mechanical Engineering, University of Arkansas
 - Associate Professor: Department of Mechanical Engineering, University of North Carolina
 - Associate Professor: Department of Mechanical Engineering, University of Texas at Arlington
 - Full Professor: Department of Metallurgical and Materials Engineering, IIT-Madras
- **Track/Symposium Organizer/Session Chair**
 - **Lead-Organizer:** "Pre-ceramic Polymers; Synthesis, Processing, Modeling, and Derived Ceramics Symposium" Materials Science & Technology Conference, Columbus OH, USA (2021)
 - **Co-Organizer:** "Controlled Synthesis, Processing, and Applications of Structural and Functional Nanomaterials" Materials Science & Technology Conference, Columbus OH, USA (2021)
 - **Co-Organizer:** "Controlled Synthesis, Processing, and Applications of Structural and Functional Nanomaterials" Materials Science & Technology Conference, Virtual Mode (2020).
 - **Co-Organizer:** "Focused Session 3: Molecular-level Processing and Chemical Engineering of Functional Materials" ICACC, Daytona Beach, FL (2020)
 - **Poster judge** for ASME International Mechanical Engineering Congress & Exposition (IMECE) Society-Wide Micro and Nano Technology Forums.
 - **Co-Organizer:** "Controlled Synthesis, Processing, and Applications of Structural and Functional Nanomaterials" Materials Science & Technology Conference, Portland, OR, USA (2019)
 - **Co-Organizer:** "Symposium: Polymer Derived Ceramics and Composites" HTCMC, Bordeaux, France (2019)
 - **Co-Organizer:** "Molecular-level Processing of Functional Materials: Understanding the

Conversion of Molecular Compounds to Solid-State and Hybrid Structures”, ICACC, Daytona Beach, FL (2019)

- **Co-Organizer:** “Symposium: Advanced Ceramics and Composites Derived from Condensed Molecular Phases for Energy and Environmental Applications” GFMAT conference, Toronto, Canada (2019)
- **Co-Organizer:** “Symposium F: Polymer-derived ceramics” The International Conference on High-Performance Ceramics, Kunming, China (2019)
- **Scientific Committee:** “Symposium: Polymer-derived ceramics development and applications”, 7th International Congress on Ceramics, Foz do Iguacu, Brazil (2018)
- **Co-Organizer:** “Controlled Synthesis, Processing, and Applications of Structural and Functional Nanomaterials” Materials Science & Technology Conference, Columbus OH, USA (2018)
- **Lead-Organizer:** “Controlled Synthesis, Processing, and Applications of Structural and Functional Nanomaterials” Materials Science & Technology Conference, Pittsburgh, PA, USA (2017)
- **Co-Organizer:** “Symposium 4: Polymer-Derived Ceramics (PDCs) and Composites” 12th Pacific Rim Conference on Ceramic and Glass Technology (PACRIM 12), Hawaii, USA (2017)
- **Session Chair:** 12th International Conference on Ceramic Materials and Components for Energy and Environmental Applications (CMCEE 2018), Singapore, (2018)
- **Session Chair:** “2-D nanomaterials (Symposium A - 2D Advanced Materials: Carbon/Graphene and NanoComposites, Session A.OR8)” Materials Research Society Meeting (B-MRS), Campinas, Brazil (2016)
- **Lead-Organizer:** “Controlled Synthesis, Processing, and Applications of Structural and Functional Nanomaterials” Materials Science & Technology Conference, Salt Lake City, Utah, USA (2016)
- **Session Chair:** “Controlled Synthesis, Processing, and Applications of Structural and Functional Nanomaterials” Materials Science & Technology Conference, Salt Lake City, Utah, USA (2016)
- **Co-Organizer:** “Polymer-derived ceramics and composites” 9th International Conference on High Temperature Ceramic Matrix Composites and Global Forum on Advanced Materials and Technologies for Sustainable Development, Toronto, Canada (2016)
- **Lead-Organizer:** “Controlled Synthesis, Processing, and Applications of Structural and Functional Nanomaterials” Materials Science & Technology Conference, Columbus OH, USA (2015)
- **Session Chair:** “Fibers and Composites Session Number: WeK2” 11th International Conference of Pacific Rim Ceramic Societies (PacRim-11), Jeju, South Korea (2015)
- **Session Chair:** “[S6-1] Batteries and Energy Storage” Materials Challenges in Alternative and Renewable Energy, Jeju, South Korea (2015)
- **Lead Organizer:** “Controlled Synthesis, Processing, and Applications of Structural and Functional Nanomaterials” Materials Science & Technology Conference, Pittsburgh, PA, USA (2014)
- **Session Chair:** “S7: 8th International Symposium on Nanostructured Materials and Nanocomposites Nanomaterials for Energy III: Batteries I”, 38th International Conference and Expo on Advanced Ceramics and Composites, Daytona Beach, FL, USA (2014)
- **Lead Organizer:** “Controlled Synthesis, Processing, and Applications of Structural and Functional Nanomaterials” Materials Science & Technology Conference, Montreal, Canada (2013)
- **Session Chair:** “Controlled Synthesis, Processing, and Applications of Structural and Functional Nanomaterials” Materials Science & Technology Conference, Montreal, Canada (2013)
- **Lead Organizer:** “Controlled Synthesis, Processing, and Applications of Structural and Functional Nanomaterials” Materials Science & Technology Conference, Pittsburgh, PA, USA (2012)
- **Co-Organizer:** “Controlled Synthesis, Processing, and Applications of Structural and Functional Nanomaterials” Materials Science & Technology Conference, Columbus OH, USA (2011)
- **Session Chair:** “Development and Applications of Nanotubes, Nanorods, Nanowires and Other One-dimensional Structures”, 5th International Symposium on Nanostructured Materials and Nanotechnology Conference: Daytona Beach FL, USA (2011)
- **Co-Organizer:** “Controlled Processing of Nanoparticle-based Materials and Nanostructured Films” Materials Science & Technology Conference, Houston TX, USA (2010)

- **Session Chair:** “Controlled Processing of Nanoparticle-based Materials and Nanostructured Films” Materials Science & Technology Conference, Houston TX, USA (2010)
- **Session Chair:** “Controlled Processing of Nanoparticle-based Materials and Nanostructured Films” Nanotechnology session at Materials Science & Technology Conference, Pittsburgh, USA (2009).
- **University Committees/Service (Kansas State University)**
 - **Faculty Advisor**, Society of Women Engineers (SWE), Kansas State University (2019-)
 - **Faculty advisor**, ASME Kansas State University (2020-)
 - **Faculty advisor**, Pi Tau Sigma Mechanical Engineering Honor Society
 - **College committee** on “International Programs”
 - **Search committee** “Director, National Gas Machinery Laboratory”
 - **Search committee** “Dean, College of Engineering”
 - **College committee** on “Frankenhoff Research Award”
 - **Department committee** on “Laboratory development”
 - **Search committee** “Professor Open Rank, Mechanical Engineering”
 - **Search committee** “Assistant Professor, Mechanical Engineering”.

- **Journal Referee**

- **Total journals: 112 in 16 years, Approx. 4 manuscripts/month**

Reviewer for: (1) Nature Nanotechnology, (2) Nature Communications, (3) ACS Nano, (4) Chemistry of Materials, (5) Advanced Energy Materials, (6) Advanced Functional Materials, (7) Small, (8) Nanoscale, (9) Journal of Physical Chemistry-C (JPC), (10) Journal of Physical Chemistry Letters (JPCL), (11) ACS-Applied Materials and Interfaces, (12) Langmuir, (13) Journal of Materials Chemistry A, (14) Journal of Materials Chemistry C, (15) Nature-Scientific Reports, (16) Applied Physics Letters, (17) IEEE Transactions on Nanotechnology, (18) Polymer Journal, (19) IEEE Sensors Journal, (20) International Journal of Smart and Nano Materials, (21) Electrochemistry Communications, (22) Acta Biomaterialia, (23) Acta Materialia, (24) Experimental Mechanics, (25) Nanoscale Research Letters, (26) Journal of the American Ceramic Society, (27) Ceramics International, (28) Electrochimica Acta, (29) The Korean Journal of Chemical Engineering, (30) Journal of Microscopy, (31) Journal of Micromechanics and Microengineering, (32) Materials Research Express, (33) Metrologia, (34) Engineering Science and Technology: an International Journal, (35) Chemical Communications, (36) Journal of the Asian Ceramic Societies, (37) Physical Chemistry Chemical Physics, (38) Progress in Organic Coatings, (39) Composites Science and Technology, (40) Advanced Science, (41) Nanomaterials, (42) Journal of Carbon Research, (43) Surface and Coatings Technology, (44) Angewandte Chemie International Edition, (45) Applied Spectroscopy, (46) Applied Sciences, (47) Chemical Engineering Journal, (48) Materials (journal), (49) Journal of Physics D: Applied Physics, (50) Polymers Open Access journal, (51) Materials Letters, (52) Energy Technology, (53) Crystals, (54) Journal of Alloys and Compounds, (55) Science Advances, (56) Diamond and Related Materials, (57) Advanced Materials Technologies, (58) Materials Chemistry and Physics, (59) Journal of Solid State Electrochemistry, (60) Chemical Science, (61) International Journal of Hydrogen Energy, (62) Molecules-Open Access Journal, and (63) Zeitschrift fuer Metallkunde, (64) Chinese Journal of Chemistry, (65) ChemElectroChem, (66) Chemical Physics Letters, (67) Materials and Design (Elsevier), (68) Chemistry of Flat Materials (Elsevier), (69) Sustainable Energy & Fuels, (70) Journal of Colloid and Interface Science (Elsevier), (71) ACS Sustainable Chemistry & Engineering, (72) ACS Energy Letters, (73) Applied Surface Science, (74) Nano Energy, (75) Journal of the European Ceramic Society, (76) Materials Research Bulletin, (77) Nano letters, (78) Advanced Materials, (79) Advanced Materials Interfaces, (80) Solid State Ionics, (81) Joule (Cell Press—the publisher of the flagship life science journal *Cell*), (82) Advanced Sustainable Systems (Wiley), (83) European Journal of Inorganic chemistry (Wiley), (84) ChemSusChem (Wiley), (85) ACS Applied Nano Materials, (86) Nano-Micro Letters, (87) ACS-Photonics, (88) Journal of Visualized Experiments, (89) Journal of Thermophysics and Heat Transfer, (90) Applied Energy (Elsevier), (91) New Journal of Chemistry (RSC journal), (92) Journal of Physics and Chemistry of Solids (Elsevier), (93) Batteries & Supercaps (Wiley journal), (94) Polymer (Elsevier journal), (95) Industrial & Engineering Chemistry Research (ACS Journal), (96) Applied Catalysis B: Environmental (Elsevier journal), (97) ACS Omega, (98) Journal of the American Chemical Society, (99) Superlattices and

Microstructures (Elsevier), (100) Ceramics (ISSN 2571-6131), (101) ACS Biomaterials Science & Engineering, (102) Chemistry Select (Wiley journal), (103) Journal of Materials Research and Technology, (104) MRS Advances, (105) Composite Interfaces (Taylor & Francis), (106) Technology & Innovation, Journal of the National Academies of Inventors, (107) Small Structures (Wiley), (108) International Journal of Applied Ceramic Technology, (109) Open Ceramics, (110) Chemical Society Reviews, (111) Ionics (Springer), and (112) ASME Journal of Energy Resources Technology.

Referee for conference proceedings: (1) ASME-IMECE-2009, (2) ASME Summer Heat Transfer Conference-2008, and (3) ASME Summer Bioengineering Conference-2012.

- **Professional Society Memberships**

(1) ASME, 2004-present, (2) ACerS (American Ceramic Society), 2008-present, (3) ASTM (American Society for Testing and Materials), 2004-present, (4) Sigma Xi Research Society, 2009-present

III. TEACHING AND MENTORING ACTIVITIES

Educational Initiatives

- Introduced a new graduate level course in Nanotechnology (course number: *ME 840 Introduction to Nanoscience and Nanotechnology*). This course consists of regular classroom lectures, lab sessions, and guest lectures by experts in the field
- Introduced new nanotechnology-based lab modules (6 hours/ week) in the *Introduction to Composites* (course number: ME 651) course. These modules are based on my recent patents on graphene and carbon nanotube composites
- I have developed methods for dissemination of scientific knowledge: regularly posted videos on YouTube (username: gsinghcuboulder) and nanoHUB.org (*total view approx. 10K+*).

Mentoring Activities

Postdoctoral Associates:

1. **Dr. Santanu Mukherjee (August 2017-July 2018).** *Currently research scientist at Swansea University, UK.* Expert in ceramic materials and metal-ion batteries. Authored several journal papers and one book chapter.
2. **Dr. M. Shareef Kolathodi (October 2015-August 2016).** *Currently Assistant Professor at the Government Arts and Science College Calicut, India.* He worked on graphene and other 2-D material-based coatings for corrosion prevention and supercapacitor applications.

Doctoral Students:

1. **Romil Bhandavat: Defended March 2013, currently employed at Intel Corp., OR.**
Dissertation title: Molecular Precursor Derived SiBCN/CNT and SiOC/CNT Composite Nanowires for Energy Based Applications.
Awards: MNE Outstanding Graduate Research Assistant Award for 2011-2012. Kansas State University Graduate Award for Academics for 2013.
2. **Lamuel David: Defended April 2015, currently employed at Fiat Chrysler, Detroit, MI.**
Dissertation title: van der Waals Sheets for Rechargeable Metal-ion Batteries.
Awards: MNE Outstanding Graduate Research Assistant Award for 2013-2014.
3. **Dipta Sarkar: Defended Jan 2020, currently employed at Intel Corp. OR.**
Dissertation title: Development of Suspended Thermoreflectance Technique and its Application in Thermal Property Measurement of Semiconductor Material.
Awards: Best poster award at the ASME International Mechanical Engineering Congress and Exposition, Salt Lake City, UT, November 2019.

- Zhongkan Ren: Defended August 2020, currently postdoc at IMSE epartment.**
Dissertation title: Polymer Derived Ceramic Fibers: Synthesis and Characterization.
- Davi Soares: Defended Summer 2021, currently employed at XALT energy in Detroit Michigan.**
Dissertation title: Comparative Study of Polymorph Nanosheet Materials for Emerging Metal-ion Batteries.
Awards: Recipient of Dr. Pau-Chang Lu Graduate Scholarship and Naim Z. and Beverly J. Azer Mechanical Engineering Graduate Scholarship. Best poster award in the Material Advantage Graduate Student Poster Competition M&ST 2020
- Shakir Mujib (Expected graduation Spring 2022): Passed prelim exam and completed coursework.**
Conducting research on biomass derived carbon, hard carbons for battery and supercapacitor applications.
Author of seven journal papers.
Awards: 2nd position in the Graduate Student Poster Competition at the 45th International Conference and Expo on Advanced Ceramics and Composites (ICACC2021) conference.
- Carla Real (Expected graduation Fall 2022):** Supported by Brazilian government, this student is jointly advised by Professor Singh and Professor Hudson at University of Campinas in Brazil on Singh's international partnerships and education project. The student spent spring/summer 2019 semesters at Kansas State and expected to return in 2021 for one full year.
- Lokesh Vendra (Expected graduation Fall 2022):** This student is co-supervised by Singh and Professor Ravikumar at IIT-Madras through MoU between K-State and IIT-Madras. The student is supported by government of India on the NSF PIRE project.

Masters Students:

- Mr. Sonjoy Dey (Spring 2021-):** MoSe₂ based ceramic fibers for rechargeable batteries.
- Mr. Federico Toigo (thesis research at K-State summer 2019; co-advisor with Paolo Colombo, University of Padova):** worked on direct write 3D printing of ceramics.
- Mr. Riccardo Cuccato (thesis done at K-State summer 2017; co-advisor with Paolo Colombo, University of Padova):** Defended December 2017, currently employed in Italy. M.S. Thesis title (December 2017): *Polymer-derived Ceramics for Energy Storage Application.*
- Ms. Priyal Parikh (Summer 2017-Fall 2018):** Non-thesis student.
- Ms. Abigail Weaver (Fall 2015-Spring 2017):** Defended December 2016, currently employed at Honeywell, Kansas City
M.S. Thesis title (December 2016): Mechanical and Electrical Properties of 3D-Printed Acrylonitrile Butadiene Styrene Composites Reinforced with Carbon Nanomaterials.
- Monsur Abass (Spring 2016-Spring 2017):** Defended December 2016, currently at Intel corp.
M.S. Thesis title (December 2016): Boron Nitride Nanotube-Modified Silicon Oxycarbide Ceramic Composite: Synthesis, Characterization and Applications in Electrochemical Energy Storage.
Awards: "1st place at the Technical Poster Competition at the National Society of Black Engineers (NSBE) 43rd Annual Convention"
- Saksham Pahwa (with co-advisor Dr. Kevin Lease):** Defended December 2015, currently employed at automotive company in India.

M.S. Thesis title (2014-2015): Titanium Dioxide/ Silicon Oxycarbide Hybrid Polymer Derived Ceramic as High Energy & Power Lithium-Ion Battery Anode Material.

8. Lamuel David (2010-2011): Defended November 2011.

M.S. Thesis title: Synthesis of Large-Area Few Layer Graphene Films by Rapid Heating and Cooling in a Modified APCVD furnace.

9. Deepu Asok (2012-2013): Defended November 2013, currently employed at Pfizer, Illinois.

M.S. Title: Study of Si(Al)CN Functionalized Carbon Nanotube Composite as a High Temperature Thermal Absorber Coating Material.

Undergraduate Students:

1. Ms. Sophia Justus (Fall 2018-Fall 2021): Senior in M.E., Kansas State University
2. Mr. Keegan Taylor (Fall 2021-current): Senior in M.E., Kansas State University
3. Mr. Mohammed Rasheed (Fall 2021-current): Junior in M.E., Kansas State University
4. Ms. Mabel Anstine (Fall 2020-current): Sophomore in M.E., Kansas State University
5. Ms. Maren Ellis (Fall 2019-Spring 2021): Senior in M.E., Kansas State University
6. Mr. Dylan Kruep (Fall 2020-Summer 2021): Presently employed at Spirit Aerosystems
7. Ms. Lanie Mannebach (Fall 2020-Spring 2021): Junior in M.E., Kansas State University
8. Ms. Porter Heiroid (Spring 2020-Fall 2020): Sophomore in M.E., Kansas State University
9. Ms. Maureen Holthaus (Fall 2019-Spring 2020): Senior in M.E., Kansas State University
10. Ms. Stacia Satzler (Summer 2018-Fall 2018): currently employed in Industry
11. Ms. Isabella Cesarone (Fall 2017-Spring 2019): currently employed at P&G, St. Louis
12. Ms. MacKenzy Meis (Fall 2017-Fall 2018): currently employed at Exxon Mobil, Houston
13. Mr. Kenneth Mcloud (Summer 2018-Fall 2018): McNair Scholar, currently at Honeywell, Kansas City
14. Ms. Kylie Alejos (Fall 2017-Spring 2018): current employed at Kiewit, Kansas City
15. Mr. Jonathan Turnley (Summer 2017): NSF-REU student; currently pursuing PhD at Purdue
16. Ms. Tyler Farthing (Spring 2017-Fall 2018): currently employed at Bechtel Oil, Gas, & Chemicals, WV
17. Ms. Jordan Walburn (Fall 2016)
18. Mr. John Petrovich (Summer 2016): NSF-REU student; currently pursuing PhD at UC-Berkeley
19. Ms. Gaby Biby (Summer 2016-Spring 2017): Design Engineer at Engineered Air
20. Ms. Diana Arreola (Fall 2015-Spring 2018)
21. Ms. Victoria Voigt (Summer 2015- Spring 2016): currently at Epic Systems, Madison, WI
22. Mr. Harrison Gunn (Summer 2015): NSF-REU student from Syracuse University, U-Penn JD/MS degree. Goodwin Law, Boston
23. Ms. Myra McLendon (Summer 2015): E.E., Kansas State University
24. Ms. Allison Sommer (2014- 2015): currently at Logic, Inc. Kansas City, KS (*Best poster award, College of Engineering*)
25. Ms. Kelsey Harlow (Spring 2015): BCS, Building Controls and Services (*Best poster award, College of Engineering*)
26. Ms. Erin Black (2013- 2014): currently working full time for an engineering firm in Salina, KS
27. Mr. Uriel Barerra (2011-2015): currently at Dow Chemicals in New Orleans, LA
28. Mr. Saksham Pahwa (Summer 2012): currently in India
29. Mr. Alex Wu (2011-2012): currently at G.E. Aviation, KS
30. Mr. Quentin Adams (2009-2011): currently at Chevron in Houston, TX
31. Mr. Samuel Browning (2009-2010): currently status unknown
32. Mr. Manuel Garcia (2009-2010): currently at ExxonMobil in Houston, TX.

IV. TEN IMPACT PUBLICATIONS [publications that are considered instrumental in advancement of engineering technology per requirement]

1. L. David, R. Bhandavat, and G. Singh*. Large Area MoS₂/graphene Composite Paper Based Electrode for Room Temperature Na-ion Batteries: Electrochemical and Mechanical Characterization. **ACS Nano**, 8 (2), pp 1759–1770 (2014). Citations: 1041

Prof. Singh and students were the first to report on mechanical and electrochemical testing of a new kind of composite consisting of layered graphene and molybdenum disulfide for sodium ion batteries. Flexible paper-like material made from graphene and molybdenum disulfide fixed swelling of electrodes in sodium-ion batteries. *This work was later patented by Prof. Singh and student [U.S. Patent No. 10,950,850. The work was highlighted in IEEE Spectrum Magazine:*

<http://spectrum.ieee.org/nanoclast/semiconductors/nanotechnology/graphene-composite-offers-critical-fix-for-sodiumion-batteries>

2. R. Bhandavat, L. David and G. Singh*. Synthesis of Surface Functionalized WS₂ Nanosheets and Performance as Li-Ion Battery Anode. **Journal of Physical Chemistry Letters** 3 (11), 1523–1530 (2012). Citations: Highlighted in *Science Daily, PhysOrg, Azo-Nano, ChemViews, and IEEE Spectrum magazine.*

3. L. David, R. Bhandavat, U. Barrera, and G. Singh*. Silicon Oxycarbide Glass-Graphene Composite Paper Electrode for Long-Cycle Lithium-ion Batteries. **Nature Communications**, 7, Article number: 10998 doi:10.1038/ncomms10998 (2016). Citations: 272

Silicon electrodes when used in Li-ion batteries tend to crack and break after just a short number of charge/discharge cycles. Meanwhile, the use of graphene on electrodes is limited because graphene's attractive surface area is only possible in single stand-alone sheets, which don't provide enough volumetric capacitance. Layer the graphene sheets on top of each other to gain that volumetric capacity, and you begin to lose that attractive surface area. Prof. Singh and student developed a technique that uses a new type of silicon-based ceramic material--silicon oxycarbide that makes the combination of silicon and graphene achieve its expected greatness as an electrode material. Stable cycling in Li-ion batteries up to 1000 cycles was demonstrated without capacity degradation. *This work is considered among this most significant works on bendable electrodes for Li-ion batteries. Prof. Singh also have patent on this material [U.S. Patent No. 10,950,850]. News media:*

<http://spectrum.ieee.org/nanoclast/semiconductors/materials/potential-of-silicon-and-graphene-together-for-liion-electrodes-realized>

4. L. David, and G. Singh*. Reduced Graphene Oxide Paper Electrode: Opposing Effect of Thermal Annealing on Li and Na Cyclability. **Journal of Physical Chemistry-C**, 118 (49), pp 28401–28408 (2014). Citations:

5. R. Bhandavat and G. Singh*. Stable and Efficient Li-Ion Battery Anodes Prepared from Polymer-Derived Silicon Oxycarbide–Carbon Nanotube Shell/Core Composites. **The Journal of Physical Chemistry C**, 117 (23), 11899–11905 (2013). Citations:

6. R. Bhandavat, A. Feldman, C. Cromer, J. Lehman, and G. Singh. *ACS-Applied Materials & Interfaces*, 5 (7), 2354–2359 (2013). Citations: 57

During the last 100 years, thermal detector coatings based on carbon-based paints, diffuse metals (gold black, silver black), oxidized metals and other materials have been investigated about spectral uniformity and resistance to damage and aging. Such coatings, however, are vulnerable to damage at high optical powers from forced air, as well as aging and hardening at UV wavelengths. To address this challenge, Prof. Singh and colleagues demonstrated synthesis of a silicon-based ceramic/carbon nanotube shell/core composite. Such coatings show high optical absorbance (98 % from UV for IR) and an unprecedented thermal damage resistance of more than 15 kW.cm⁻² at 10.6 μm, **highest reported value for any material to date.** *This material has been patented by Singh and student [U. S. Patent No. 9,453,111]. It was also highlighted in NIST Technical Beat,* <http://www.nist.gov/pml/div686/nanotubes-041713.cfm>

7. L. David, A. Feldman, E. Mansfield, J. Lehman, and G. Singh*. Evaluating Thermal Damage Resistance of Graphene/Carbon Nanotube Hybrid Composite Coatings. **Scientific Reports (Nature Publishing Group)** 4, Article number: 4311 (2014).

8. **L. David, D. Asok, and G. Singh***. Synthesis and Extreme Rate Capability of Si–Al–C–N Functionalized Carbon Nanotube Spray-on Coatings as Li-Ion Battery Electrode. **ACS-Applied Materials & Interfaces**, DOI: 10.1021/am5052729 (2014). **Citations:**

A new kind of liquid polymer was developed that can be transformed into ultrahigh temperature ceramic upon heating. The liquid polymer may also be used in 3-D printing of ceramics. The waterlike polymer, which becomes a ceramic when heated, also can be mass-produced. *This work was later patented by Prof. Singh and student [U.S. Patent No. 9,908,905].*

9. G. Singh*, P. Rice, R.L. Mahajan, and J.R. McIntosh. *Nanotechnology*, 20, 095701 (2009). **Citations: 21**
This work, performed by Professor Singh as PhD student was the first demonstration of fabrication and mechanical testing of a carbon nanotube-based compression cutting tool for biological applications.

This work was highlighted in Nanowerks and Singh interviewed for History Channel Modern Marvels—World's Sharpest: <https://www.nanowerk.com/spotlight/spotid=9315.php>

10. G. Singh*, P. Rice, R.L. Mahajan, and J.R. McIntosh. Fabrication and Characterization of a CNT Based Nano-Knife. **Nanotechnology**, 20, 095701 (2009).

Link for Complete List of Journal Publications

Google scholar <https://scholar.google.com/citations?user=tnUO0zoAAAAJ&hl=en&oi=ao>

Patents Applications/Invention Disclosures (five issued)

1. **L. David**, and **G. Singh**. Robust MoS₂/graphene Composite for Na⁺ Battery Application; U.S. Patent No. 10,950,850, **issued** March 16, 2021.
2. **L. David**, **R. Bhandavat** and **G. Singh**. Flexible Silicon oxycarbide Graphene Composite Electrodes for High-Rate Performance Lithium-ion Batteries; U.S. Patent No. 10,553,853 **issued** on Feb. 4, 2020
3. **L. David**, and **G. Singh**. Aluminum-Modified Polysilazanes for Polymer-Derived Ceramic Nanocomposites; U.S. Patent No. 9,908,905, **issued** March 6, 2018.
4. **R. Bhandavat**, and **G. Singh**. Boron-Modified Silazanes for Synthesis of SiBNC Ceramics; United States Patent No. 9,453,111, **issued** on September 27, 2016.
5. **L. David**, and **G. Singh**. Silicon-Based Polymer-Derived Ceramic Composites Comprising h-BN Nanosheets, United States Patent No. US10093584B2, **issued** on October 09, 2018.
6. **G. Singh**. U.S. Provisional Patent Application No. 62/219,545-Transitional Metal Dichalcogenides Functionalized with Polymer-Derived Ceramic and Uses Thereof; Filed September 16, 2015; Docket No. 47555-PRO.
7. **L. David**, and **G. Singh**. U. S. Provisional Patent Application 61/862,289 - Robust MoS₂/graphene Composite for Na⁺ Battery Application; PCT Filed August 5, 2014; Docket No. 45573-PCT.
8. **Z. Ren** and **G. Singh**. Provisional Patent Application No.: 63/011,402 Electrospun SiOC Fiber Mats from Polyvinylpyrrolidone/preceramic Siloxanes Hybrid Systems Filed April 17, 2020.
9. **G. Singh**. U.S. Provisional Patent Application 62/899,942- Polymer-derived Ceramic Fibers and Methods of Preparing the Same; PCT Filed Sept. 13, 2019; Docket 52786-PRO.
10. **G. Singh**. U.S. Provisional Patent Application 62/887,189- Inorganic Polymer Material for Fused Deposition Modeling (FDM); Filed Aug. 15, 2019.
11. G. Singh. Polymer-derived ceramic coated SiBNC and SiHfCN coated carbon fibers and fiber mats for high temperature applications. February 2020. (Invention disclosure). KSURF Disc. 2020-050
12. G. Singh. KSURF Disc. 2019-027. Title: " SiCNO Ceramic Fibers from Hybrid Organic/inorganic Pre-ceramic Polymer". July 2019. (Invention disclosure).
13. G. Singh. KSURF Disc. 2019-027. Title: "Fused Deposition Modeling (FDM) of Silicon-based High Temperature Polymers". January 2019. (Invention disclosure).

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15. G. Singh and R.L. Mahajan. Virginia Tech Intellectual Property; Spray Coatings of Polymer Derived SiCN Particles, April 2009. (Invention disclosure).

Books Co-Edited

1. *Processing, Properties, and Design of Advanced Ceramics and Composites: Ceramic Transactions*, Volume 259, John Wiley & Sons, ISBN: 978-1-119-32364-8
2. *Processing and Properties of Advanced Ceramics and Composites VII: Ceramic Transactions*, Volume 252, John Wiley & Sons, ISBN: 978-1-119-18387-7
3. *Processing and Properties of Advanced Ceramics and Composites VI: Ceramic Transactions*, Volume 249, John Wiley & Sons, ISBN: 978-1-118-99549-5.
4. *Processing and Properties of Advanced Ceramics and Composites V: Ceramic Transactions*, Volume 240, John Wiley & Sons, ISBN: 978-1-118-74409-3
5. *Advances in Nanomaterials and Nanostructures: Ceramic Transactions*, Volume 229. John Wiley & Sons, ISBN: 978-1-1180-6002-5.

Invited Book Chapters

1. **D. Soares, S. Mukherjee**, and G. Singh*. Transition metal dichalcogenides as active anode materials for sodium-ion batteries. Book Title: Handbook of Sodium-Ion Batteries: Materials and Characterisation, Publisher: Jenny Stanford Publishing, Publication Date: 2021
2. **Z. Ren, S. Mukherjee**, and G. Singh*. Graphene Based Hybrid Materials for Advanced Batteries. Book Title: 2D Nanomaterials for Energy Applications, Publisher: Elsevier, Publication Date: Sept. 2019.

Presentations and Invited Talks

Singh has more than 165 Conference Abstracts and Invited lectures to his credit.