Shivaranjan Raghuraman

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RESEARCH AREAS:
Tip-Based Nanomanufacturing; Nano-tribology; Nanomechanics; Energy Storage; Mechanochemistry; Mechanochemical Synthesis; Machine Design; Instrumentation; Programming

WORK HISTORY:

April 2021 - Present	Postdoctoral Research Associate, Oak Ridge National Laboratory	Oak Ridge, TN
March 2020 - April 2021	Research Scientist, C-Crete Technologies LLC.	Stafford, TX

EDUCATION:

May 2020 *(Advisor: Dr. Jonathan Felts)*	TEXAS A&M UNIVERSITY PhD in Mechanical Engineering	College Station, TX
May 2012	ANNA UNIVERSITY B.E. in Mechanical Engineering	Chennai, India

AWARDS AND HONORS:

5. Winner - Three Minute Thesis (3MT) **2019-2020** (Doctoral Division), Texas A&M University. Link to Talk Department Feature

4. Emil Buehler Aerodynamic Analog Fellowship **(2019)**, Texas A&M University.

3. Graduate Summer Research Grant **(2019)**, Department of Mechanical Engineering, Texas A&M University (P.I. "Relationship Between Atomic Scale Friction and Surface Chemical Composition")

2. Graduate Travel Award **(2019)**, Texas A&M University.

1. Graduate Travel Award **(2016)**, Texas A&M University.

REFEREED JOURNAL PUBLICATIONS / PATENTS:

8. Raghuraman, S., Liu, Y., Kelley, K., Vasudevan, R.K. & Jesse, S., “Python and FPGA based Workflow for Automated and Interoperable Scanning Probe Microscopy”, Microscopy and Microanalysis, 2022.

7. Advincula, P. A., Luong, D. X., Chen, W., Raghuraman, S., Shahsavari, R., & Tour, J. M. (2021). Flash graphene from rubber waste. Carbon, 178, 649-656.

6. Raghuraman, S., Boonpuek, P., King, K. H., Ye, Z., & Felts, J. R. (2021). The Role of Speed in Atomic Scale Wear. The Journal of Physical Chemistry C, 125(7), 4139-4145.

5. Wyss, K. M., Beckham, J. L., Chen, W., Luong, D. X., Hundi, P., Raghuraman, S., ... & Tour, J. M. (2020). Converting Plastic Waste Pyrolysis Ash into Flash Graphene. Carbon.

4. Felts, Jonathan R., et al. "Method and device for quantitative control of force in mechanochemical reactions." U.S. Patent No. 10,894,243. 19 Jan. 2021.

3. Raghuraman, S., Shah, S. A., Green, M. J., & Felts, J. R. (2020). Mechanics of nanoscale crumpled graphene measured by Atomic Force Microscopy. Extreme Mechanics Letters, 100873.

2. Raghuraman, S., Soleymaniha, M., Ye, Z., & Felts, J. R. "The role of mechanical force on the kinetics and dynamics of electrochemical redox reactions on graphene." *Nanoscale* 10.37 (**2018**): 17912-17923.

1. Raghuraman, S., Elinski, M. B., Batteas, J. D., & Felts, J. R. "Driving Surface Chemistry at the Nanometer Scale Using Localized Heat and Stress." *Nano letters* 17.4 (**2017**): 2111-2117.

PUBLICATIONS / PATENTS IN PROGRESS

7. Rghuraman, S., Olunloyo, G., Kai, X. & Jesse, S., “Strain Engineering of Two-Dimensional Materials - Quantitative Strain Mapping through Correlated Raman Spectroscopy”.

6. Kelley, K., Kalinin, S., Eliseev, E., Raghuraman, S., Jesse, S., Maksymovych, P. & Morozovska, A., “Probing temperature-induced phase transitions at individual ferroelectric domain walls”.

5. Raghuraman, S., Kelley, K. & Jesse, S. “ Scanning Ferroelectric Domain Wall Oscillator”

4. Raghuraman. S, & Jesse, S. “Development of Nano Rotor with Sub-Micro Radian Precision for Exploring Directional Anisotropy of Material Properties in 2D Materials.”

3. Raghuraman, S. & Vasudevan, R. K. “Induced Ferroelectricity at Interfaces - Effects of Twisted Grain Boundaries”

2. Raghuraman, S., Betteas, J. D., Nwoye, E., Henry, L., Kelly, C & Felts, J. R. “Quantitative Control of Mechanochemical Activation to Tune Product Selectivity in Metal Organic Framework Compounds”

1. Soleymaniha, M., Raghuraman, S., & Felts, J.R. “Heated atomic force microscope cantilever with integrated thermocapillary pumping for additive polymer nanolithography”

NON-REFEREED PUBLICATIONS (CONFERENCE POSTERS AND PRESENTATIONS):

9. Raghuraman, S., YSiaN - Your Science in a Nutshell **(2021)**, “Probing Multiphysical Reactions with Scanning Probe Techniques”

8. Raghuraman, S. & Felts, J.R. **,** ViViMat **(2021),** “Speed Depdence of Atomic Scale Wear - A Unified Theory for Dry Wear ”

7. Raghuraman, S. and Felts, J.R. (**2019**) “The Chemistry of Friction, Wear and Tribo Film Growth on 2D materials”, *STLE Annual Meeting and Exhibition.*

6. Raghuraman, S., Elinski, M.B., Batteas, J.D., & Felts, J.R. "Chemistry of friction, wear, and tribofilm growth on 2D materials." *Abstracts of Papers of The American Chemical Society*. Vol. 255. 1155 16TH ST, NW, WASHINGTON, DC 20036 USA: AMER CHEMICAL SOC, **2018**.

5. Raghuraman, S. and Felts, J.R. **(2017)** “Measuring Electro-Mechano-Chemical Reactions on Graphene using AFM: Probing the Relationship between Stress, Strain and Reactivity at the Nanometer Scale”, *International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (IDETC-CIE)*

4. Raghuraman, S., Elinski, M.B., Batteas, J.D., & Felts, J.R. "Measuring atomic wear of graphene using local stress and heat." *Abstracts of Papers of The American Chemical Society*. Vol. 253. 1155 16TH ST, NW, WASHINGTON, DC 20036 USA: AMER CHEMICAL SOC, **2017**.

3. Raghuraman, S. and Felts, J.R. (**2016**) “Driving Surface Chemistry at the Nanometer Scale Using Localized Heat and Stress.”, *Materials Research Society Fall Meeting.*

2. Raghuraman, S. and Felts, J.R. **(2016)** "Chemical Kinetics on Graphene Using Local Stress and Heat", *AmeriAmeriMech Symposium: Mechanical Behavior of 2D Materials - Graphene and Beyond.*

1. Raghuraman, S. and Felts, J.R. **(2016)** "Nano-lithographic Chemical Patterning on Graphene Using Local Stress and Heat", *EIPBN.*

RESEARCH & TEACHING

Spring 2015 – 2020 **GRADUATE ASSISTANT – RESEARCH,** Texas A&M University, College Station TX

Fall 2017, Spring 2018 and Fall 2018 **GRADUATE ASSISTANT – TEACHING**, Texas A&M University, College Station TX

- Spring 2019 - MEEN 461 Heat Transfer - substitute for 4 sessions
- Fall 2018 - MEEN 630 Intermediate Heat Transfer - T.A.
- Spring 2018 - MEEN 260 Mechanical Measurements - Laboratory Instructor
- Spring 2018 - MEEN 210 Geometric Modelling - T.A.
- Fall 2017 - MEEN 225 Engineering Mechanics - T.A. and substitute for 5 sessions

SKILLS AND EXPERTISE:

Nano and Microfabrication
- Atomic Force Microscopy
- Lithography & Clean Room

Materials Characterization
- Nano Infra-Red/Scanning Near Field Optical Microscope
- Scanning Electron Microscope
- Transmission Electron Microscope
- Infra-Red & Raman Spectroscopy
- NanoIndentation

Programming & Data Analyses
- Python
- LabView & FPGA
- Matlab
- Igor

Machine Design & Simulation
- SolidWorks
- Creo
- Ansys
- Abaqus