

Ravinder

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Nationality: Indian
Born: 29/01/1994

RESEARCH INTERESTS

Machine learning aided material design, physics informed machine learning, material modelling, dynamic fracture and crack propagation on ballistic impact, molecular dynamics and peridynamics.

EDUCATION

PhD, Civil Engineering 2017-Present
Indian Institute of Technology Delhi, Delhi

B. Tech., Civil Engineering 2011-2015
Indian Institute of Technology Roorkee, Roorkee

RESEARCH ACHIEVEMENTS AND AWARDS

PyGGi (Python for Glass Genomics)

It is an indigenous industry-relevant software package that uses trained Machine Learning algorithms to predict/optimize composition-property relationships in inorganic glasses. It will make the tedious process of designing tailored glasses economical in terms of time, effort, and money.

The software package is launched through FITT IITD and is available at www.pyggi.iitd.ac.in.

Awards:

- ICG-GOMD 2019 registration grant (2019).
- Prime Ministers Research Fellowship (PMRF) (2020)
- SITARE/SRISTI Gandhian Young Technological Innovation (GYTI) Awards/Appreciations (2020)
- SERB Travel grant (2022)

SOFTWARE AND PROGRAMMING LANGUAGES

- **Packages Developed:**

Peridynamics: **PeriDyn.jl**, **PDMesh.jl** and **PDBenchmark.jl**

Molecular Dynamics: **MDSimulator.jl** and **MDBase.jl**

Others: **GlassConversionPy**

All packages can be accessed at the [github repository](#).

- **Operating Systems:** Linux, MacOS and Windows

- **Softwares:** LAMMPS, NAMD, Peridigm, R.I.N.G.S, Ovito, VMD, Abaqus and STAADPRO

- **Languages:** Julia, Python, C++ and Matlab

PUBLICATIONS

1. Zaki, Mohd, Venugopal, Vineeth, **Bhattoo, Ravinder**, Bishnoi, Suresh, Singh, Sourabh Kumar, Allu, Amarnath R, and Krishnan, NM Anoop. **Interpreting the optical properties of oxide glasses with machine learning and Shapely additive explanations**. Journal of the American Ceramic Society (2022)
2. Bishnoi, Suresh, **Ravinder, R**, Grover, Hargun Singh, Kodamana, Hariprasad, and Krishnan, NM Anoop. **Scalable Gaussian processes for predicting the optical, physical, thermal, and mechanical properties of inorganic glasses with large datasets**. Materials Advances (2021)
3. **Ravinder, R**, Venugopal, Vineeth, Bishnoi, Suresh, Singh, Sourabh, Zaki, Mohd, Grover, Hargun Singh, Bauchy, Mathieu, Agarwal, Manish, and Krishnan, NM Anoop. **Artificial intelligence and machine learning in glass science and technology: 21 challenges for the 21st century**. International Journal of Applied Glass Science (2021)
4. **Ravinder, R**, Kumar, Abhishek, Kumar, Rajesh, Vangla, Prashanth, and Krishnan, NM Anoop. **Irradiation-induced brittle-to-ductile transition in α -quartz**. Journal of the American Ceramic Society (2020)
5. **Ravinder, R**, Sridhara, Karthikeya H, Bishnoi, Suresh, Grover, Hargun Singh, Bauchy, Mathieu, Jayadeva, J, Kodamana, Hariprasad, and Krishnan, NM Anoop. **Deep Learning Aided Rational Design of Oxide Glasses**. Materials Horizons (2020)
6. Nayak, Sumeru, **Ravinder, R**, Krishnan, NM, and Das, Sumanta. **A Peridynamics-Based Micromechanical Modeling Approach for Random Heterogeneous Structural Materials**. Materials (2020)

7. Bhaskar, Pratik, Kumar, Rajesh, Maurya, Yashasvi, **Ravinder, R**, Allu, Amarnath R, Das, Sumanta, Gosvami, Nitya Nand, Youngman, Randall E, Bødker, Mikkel S, and Mascaraque, Nerea. **Cooling rate effects on the structure of 45S5 bioglass: Insights from experiments and simulations.** Journal of Non-Crystalline Solids (2020)
8. **Ravinder, R**, Singh, Sourabh, Bishnoi, Suresh, Jan, Amreen, Sharma, Amit, Kodamana, Hariprasad, and Krishnan, NM Anoop. **An adaptive, interacting, cluster-based model for predicting the transmission dynamics of COVID-19.** Heliyon (2020)
9. Krishnan, NM Anoop, **Ravinder, R**, Kumar, Rajesh, Le Pape, Yann, Sant, Gaurav, and Bauchy, Mathieu. **Density-stiffness scaling in minerals upon disordering: Irradiation vs. vitrification.** Acta Materialia (2019)
10. **Ravinder, R**, Kumar, Rajesh, Agarwal, Manish, and Krishnan, NM. **Evidence of a two-dimensional glass transition in graphene: Insights from molecular simulations.** Scientific reports (2019)
11. Dhawan, Sameer, Ghosh, Sukanya, **Ravinder, R**, Bais, Sachendra S, Basak, Soumen, Krishnan, NM Anoop, Agarwal, Manish, Banerjee, Manidipa, and Haridas, V. **Redox sensitive self-assembling dipeptide for sustained intracellular drug delivery.** Bioconjugate chemistry (2019)
12. Bishnoi, Suresh, Singh, Sourabh, **Ravinder, R**, Bauchy, Mathieu, Gosvami, Nitya Nand, Kodamana, Hariprasad, and Krishnan, NM Anoop. **Predicting Youngs modulus of oxide glasses with sparse datasets using machine learning.** Journal of Non-Crystalline Solids (2019)
13. Rivera, Jared, Berjikian, Jonathan, **Ravinder, R**, Kodamana, Hariprasad, Das, Sumanta, Bhatnagar, Naresh, Bauchy, Mathieu, and Krishnan, NM. **Glass fracture upon ballistic impact: new insights from peridynamics simulations.** Frontiers in Materials (2019)
14. **Ravinder, R**, Garg, Prateet, and Krishnan, NM Anoop. **Glass Transition and Crystallization in Hexagonal Boron Nitride: Crucial Role of Orientational Order.** Advanced Theory and Simulations (2019)
15. Zaki, Mohd, Venugopal, Vineeth, **Ravinder, R**, Bishnoi, Suresh, Singh, Sourabh Kumar, Allu, Amarnath R, and Krishnan, NM. **Unveiling the Glass Veil: Elucidating the Optical Properties in Glasses with Interpretable Machine Learning. (Submitted).** arXiv preprint arXiv:2103.03633 2021
16. **Ravinder, R**, Bishnoi, Suresh, Zaki, Mohd, and Krishnan, NM. **Revealing the compositional control of electrical, mechanical, optical, and physical properties of inorganic glasses. (Submitted).** arXiv preprint arXiv:2103.12050 2021

17. **Bhattoo, Ravinder, Ranu, Sayan, and Krishnan, NM. Lagrangian Neural Network with Differentiable Symmetries and Relational Inductive Bias. (Submitted).** arXiv preprint arXiv:2110.03266 2021
18. **Bhattoo, Ravinder, Ranu, Sayan, and Krishnan, NM Anoop. Momentum Conserving Lagrangian Neural Networks. (Submitted).** nan 2021

Please go to <https://scholar.google.com/citations?user=IPTdGRMAAAAJ&hl=en> for complete list of publications.

RESEARCH CONFERENCE AND WORKSHOP

COMPFLU-2018: 12th International Conference on Complex Fluids and Soft Matter December 2018

Indian Institute of Technology Roorkee, Roorkee

Poster: Role of topological defects on the rigidity of glassy graphene.

Advanced Simulation Methods: DFT, MD and Beyond March 2019

Indian Institute of Technology Delhi, New Delhi

Tutor: Molecular dynamics workshop 2

Poster: Two-dimensional glass transition in graphene: Insights from molecular simulations.

Machine Learning For Engineering Applications (TEQIP Course) June 2019

Indian Institute of Technology Delhi, New Delhi

Tutor: Introduction to Machine Learning.

IIT Delhi Industry Day 2019 September 2019

Indian Institute of Technology Delhi, New Delhi

Poster: Designing Functional Glasses using Machine Learning.

Artificial Intelligence Concepts and Multidisciplinary Applications in Modern Biology September 2019

International Center for Genetic Engineering and Biotechnology, New Delhi

Tutor: Introduction to Machine Learning Tools.

Material Science and Technology (MS&T) 2019 October 2019

Oregon Convocation Center, Portland, USA

Talk: Machine learning to predict the elastic properties of glasses.

Materials Science and Technology (MS&T) 2021 October 2021

Columbus, Ohio, USA (Virtual)

Talk: Understanding the Composition-property Relationship of Glasses Using Interpretable Machine Learning

MRS Fall Meeting 2021 December 2021

Boston, Massachusetts, USA (Virtual)

Talk: Molecular Dynamics Simulation Using Graph Neural Networks

**14th Pacific Rim Conference on Ceramic and Glass Technology and GOMD 2021
Division Meeting** December 2021

Vancouver, British Columbia, Canada (Virtual)

Talk: Decoding the Genome of Inorganic Glasses using Interpretable Machine Learning

2022 Glass and Optical Materials Division Annual Meeting May 2022

Hyatt Regency Baltimore, Baltimore, MD, United States

Talk: Learning Quantum-accuracy Interatomic Potential for Silica Using Lagrangian Graph Neural Networks

Talk: Learning interaction laws in atomistic system using Lagrangian Graph Neural Networks

11th European Solid Mechanics Conference July 2022

NUI, Galway, Ireland

Talk: PeriDyn: A Peridynamics Package Written in Julia Programming Language

**XXX International Materials Research Congress (IMRC2022) and International
Conference on Advanced Materials (ICAM2021)** August 2022

Cancun, Mexico

*Talk: Understanding the Compositional Control on Electrical, Mechanical, Optical, And
Physical Properties of Inorganic Glasses with Interpretable Machine Learning*

Talk: Lagrangian and Hamiltonian Graph Neural Networks for Robust Molecular Simulations

WORK EXPERIENCE

Trainee Structural Design Engineer

8 months

ASC Infratech Pvt Ltd

Noida, Uttarpradesh, India