VINAY RASTOGI

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PERSONAL

Date of birth: September 03, 1989
Residence Address: 105 W 39th St, Apt. 719, Baltimore, MD-21210, USA.

ACADEMIC

Postdoctoral Fellow : 2018-Present		Hopkins Extreme Material Institute, Johns Hopkins University, USA
Ph.D. (Physics) 2012-2018	:	Homi Bhabha National Institute, Mumbai-400094, India Constituent Institute-Bhabha Atomic Research Centre, Mumbai-400085, India
Thesis title	:	Study of Materials Behavior Under Dynamic Shock Loading Using High Power Lasers
Thesis Supervisor	:	Prof. M. N. Deo, Bhabha Atomic Research Centre, Mumbai, India
2009-2011	:	**Master of Science** in Physics with specialization in Electronics, University of Lucknow, Lucknow, India
2006-2009	:	**Bachelor of Science**, University of Lucknow, Lucknow India

CURRENT RESEARCH

My current research is focused on the phase diagram studies of different materials under dynamic compression. I am interested in such experiments here to understand the kinetics of diffusion, phase transformations and their rate dependence under extreme conditions.

PAST RESEARCH

Understanding the materials response at conditions relevant to dynamic loading has been central to advances in fundamental science and modern technology. By coupling laser-driven shock with ultrafast optical excitation and suitable probes, it is possible to observe molecular vibrations under shock compression with picosecond time resolution. I had been interested in such systems to monitor the molecular level changes in polymeric materials under shock compression such as phase transitions and chemical reactions etc. using time-resolved Raman spectroscopy.

RESEARCH EXPERIENCE

- X-ray diffraction studies
- 1D line VISAR analysis
- Raman spectroscopy of Laser-shocked materials: Performing Laser driven shock experiments and data analysis
- (in-house and user samples), maintaining and upgrading facility at Laser Shock Laboratory, BARC Mumbai.
- Design and development of time-resolved Raman spectroscopy facility
- Designing of confinement geometry target assemblies
- Time resolved spectroscopy
- Laser-matter interaction studies
- Thomson Parabola Ion Spectrometer

KEY SKILLS

- Experienced in operating high power Laser systems
- Have the abilities to design and instrumentation for the experimental facilities
- Time resolved measurements

- Software's acquainted: Simion, Origin Lab, 2D Auto CAD etc.

AWARDS AND GRANTS

- Department of Atomic Energy, Government of India, Doctoral Research Fellowship.
- Department of Science & Technology (DST-SERB ITS) International Travel Grant.
- Strong Field Science International Travel Grant.

MEMBERSHIP OF PROFESSIONAL BODIES

- Member of European High-Pressure Research Group (EHPRG)
- Life Member of Indian Physics Association (IPA)

ORAL PRESENTATIONS

- Oral Presentation on "Vibrational Spectroscopy of aromatic scintillating polymer under laser-driven shock compression" delivered at 6th International Conference on Perspectives in Vibrational Spectroscopy, Lucknow (India), Nov. 5-8, 2016.
- Oral Presentation on "Vibrational spectroscopy of polyvinyl-toluene under laser-driven shock compression" delivered at 34th European Conference on Laser Interaction with Matter, Moscow (Russia), Sept. 18-23, 2016.
- Oral Presentation "Spectroscopic studies of polytetrafluoroethylene under laser driven shock compression" delivered at International Conference on Photons: Multiple & Creative Solutions to Challenges (ICPMCSC), Mumbai (India), Dec. 4-5, 2015.

INTERNATIONAL EVENTS ATTENDED

- 9th High Pressure Mineral Physics Seminar (HPMPS-9), 24-28 Sep. 2017, Saint Malo, France.
- 34th European Conference on Laser Interaction with Matter (ECLIM 2016), 18-23 Sep. 2016, Moscow, Russia.
- 54th European High Pressure Research Group Meeting (EHPRG 2016), 4-9 Sep. 2016 Bayreuth, Germany.

LIST OF PUBLICATIONS

REFEREED JOURNALS

1. **Vinay Rastogi**, Raymond F. Smith, Richard J. Briggs, Martin G. Gorman, Connor Krill, Amy Coleman, Cynthia A. Bolme, Damian C. Swift, Hae Ja Lee, Phil Heimann, June K. Wicks, "Femtosecond diffraction studies of the Sodium Chloride phase diagram under laser-shock compression" (Under Preparation)
2. S. Chaurasia, **Vinay Rastogi**, Usha Rao, M. N. Deo, "Development of in situ time-resolved Raman Spectroscopy facility for dynamic shock loading in materials" *Journal of Instrumentation, 12, (2017) P11008*
3. **Vinay Rastogi,** S. Chaurasia, U. Rao, C. D. Sijoy, H. K. Poswal, V. Mishra, M. Kumar, M. N. Deo, "In-situ Raman spectroscopic studies of poly-vinyl-toluene under laser-driven shock compression and comparison with hydrostatic experiments" *Journal of Raman Spectroscopy, 48, (2017)1300-1306*
4. **Vinay Rastogi,** Usha Rao, S. Chaurasia, C. D. Sijoy, V. Mishra, S. Chaturvedi, M. N. Deo, "Time resolved Raman spectroscopy of polytetrafluoroethylene under laser shock compression" *Appl. Spec. 71, (2017) 2643-2652*
5. **Vinay Rastogi,** S. Chaurasia, U. Rao, C. D. Sijoy, V. Mishra, M. Kumar, S. Chaturvedi, M. N. Deo, "Time-resolved Raman spectroscopy of polystyrene under laser driven shock compression" *Journal of Raman Spectroscopy 48 (2017) 1007-1012*
6. **Vinay Rastogi**, S. Chaurasia, D. S. Munda, "Laser induced damage studies in borosilicate glass using nanosecond and sub nanosecond pulses", *Journal of Non-Crystalline Solids 463 (2017) 138–147*
7. **Vinay Rastogi**, S. Chaurasia, U. Rao, C. D. Sijoy, V. Mishra, M. Kumar, M. N. Deo, S. Chaturvedi, S. M. Sharma, "Raman spectroscopy of laser shocked polystyrene" *Journal of Raman Spectroscopy 48 (2017) 458-464*
8. S. Chaurasia, C. Kaur, **V. Rastogi,** A. K. Poswal, D. S. Munda, R. K. Bhatia, V. Nataraju, "In situ measurement of ions parameters of laser produced ion source using high resolution Thomson parabola spectrometer" *Journal of Instrumentation 11 (2016) P08004*

CONFERENCES/NEWS LETTERS/WORKSHOP

1. **Vinay Rastogi,** Raymond F. Smith, Richard J. Briggs, Martin G. Gorman, Cynthia A. Bolme, Connor Krill, Damian C. Swift, Hae Ja Lee, Phil Heimann, June K. Wicks, "Femtosecond diffraction studies of phase transitions in Sodium Chloride under dynamic shock compression", *COMPRES annual meeting, Montana USA 2- 5 Aug. 2019*
2. Richard Briggs, Amy Coleman, Shuai Zhang, David McGonegle, Federica Coppari, Martin Gorman, Michelle Marshall, Raymond Smith, Orianna Ball, Ryan McWilliams, Vitali Prakapenka, Conor Krill, **Vinay Rastogi**, June Wicks, Cynthia Bolme, Philip Heimann, Eric Cunningham, Haeja Lee, Malcolm McMahon, Jon Eggert, Dayne Fratanduono, "Probing liquid-liquid phase transitions under dynamic compression: an X-ray diffraction and ab initio MD study of selenium" *Bulletin of the American Physical Society 65, (2020).*
3. **Vinay Rastogi,** S. Chaurasia, U. Rao, C. D. Sijoy, V. Mishra, M. N. Deo, "Vibrational Spectroscopy of Laser Shocked PMMA" *9th High Pressure Mineral Physics Seminar (HPMPS-9) Saint Malo, France 24-28 Sep.2017*
4. I. V. Akimova, A. A. Akunets, N. G. Borisenko, S. Chaurasia, A. I. Gromov, C. Kaur, D. S. Munda, D. S. Orekhov, A. S. Orekhov, G. V. Sklizkov, S. M. Tolokonnikov, U. Rao and **V. Rastogi,** "Metal nano-particles modernized layers and those with polymers for laser thermonuclear targets", Journal of Physics: Conference Series, 907, (2017)
5. **Vinay Rastogi,** Usha Rao, S. Chaurasia, H. K. Poswal, Manmohan Kumar, S. M. Sharma, "High pressure Raman study polyvinyl-toluene (PVT)" 54th European High Pressure Research Group Meeting Bayreuth, Germany 4-9 Sep. (2016)
6. **Vinay Rastogi**, Usha Rao, S. Chaurasia, A. K. Mishra, H. K. Poswal, M. N. Deo, S. M. Sharma, "Pump-probe based Raman spectroscopic studies of PTFE under laser driven shock compression" AIP Conf. Proc. **1731,** 060025 (2016)
7. **V. Rastogi,** U. Rao, S. Chaurasia, H. K. Poswal, M. Kumar, M. N. Deo, S. M. Sharma, "Vibrational spectroscopy of polyvinyl-toluene under laser- driven shock compression" 34th European Conference on Laser Interaction with Matter (ECLIM 2016) Moscow, Russia
8. U. Rao, **V. Rastogi**, S. Chaurasia, M. N. Deo, S. M. Sharma, "Pump-probe based vibrational spectroscopy of carbon tetra-chloride under laser driven shock compression" 34th European Conference on Laser Interaction with Matter (ECLIM 2016) Moscow, Russia
9. **Vinay Rastogi**, S. Chaurasia, U. Rao, C. D. Sijoy, V. Mishra, M. Kumar, S. Chaturvedi, S. M. Sharma, "Vibrational Spectroscopy of aromatic scintillating polymer under laser-driven shock compression" 6th International conference on perspectives in vibrational spectroscopy, 5-8 Nov. 2016, Lucknow, India
10. **Vinay Rastogi**, U. Rao, S. Chaurasia, Manmohan Kumar, M. N. Deo, Surinder M. Sharma, "Laser shocked high pressure and time resolved Raman spectroscopy of Polystyrene" DAE-BRNS Symposium on Condensed Matter Physics under Extreme Conditions (CoMPEC 2016)
11. U. Rao, S. Chaurasia, C. D. Sijoy, **Vinay Rastogi,** V. Mishra, S. Chaturvedi, M. N. Deo, S. M. Sharma, "The effect of geometric confinement on laser driven shock propagation in Aluminium-polytetrafluoroethylene (PTFE) layered target" DAE-BRNS Symposium on Condensed Matter Physics under Extreme Conditions (CoMPEC 2016)
12. **Vinay Rastogi,** Usha Rao, S. Chaurasia, M. N. Deo, S. M. Sharma, "Spectroscopic studies of polytetrafluoro - ethylene under laser driven shock compression" International conference on Photons: Multiple and creative solutions to challenges (ICPMCSC) Ratnam College, Mumbai (2015)
13. Usha Rao, C. D. Sijoy, S. Chaurasia, **Vinay Rastogi,** S. Chaturvedi, S. M. Sharma, "Numerical Simulation study of laser driven shock waves in direct and confinement geometry targets" International conference on Photons: Multiple and creative solutions to challenges (ICPMCSC) Ratnam College, Mumbai (2015)
14. **Vinay Rastogi,** Channprit Kaur, P. Leshma, D. S. Munda, S. Chaurasia, "Study of laser induced damage mechanism on the surface of BK7 glass using nanosecond and sub nanosecond pulses" 4th International conference on Current development in Atomic, Molecular, Optical & Nanophysics with applications, University of Dehli, Dehli (2015)

15. S. Chaurasia, **Vinay Rastogi**, R. K. Bhatia, V. Nataraju, D. S. Munda, S. M. Sharma, "Thomson Parabola: A high resolution Spectrometer" BARC Newsletter 2015, http://www.barc.gov.in/publications/nl/2015/2015050604.pdf
16. "Facility for Time Resolved Raman Spectroscopy of Materials Under Shocks" Brief Communication, BARC Newsletter, July-August 2015, http://www.barc.gov.in/publications/nl/2015/2015070802.pdf
17. Channprit Kaur, S. Chaurasia, **V. Rastogi**, Usha Rao, A.K.Poswal, D. S. Munda, "K-shell X-ray spectroscopy of laser produced Aluminium plasma" National Laser Symposium (NLS-24), RRCAT, Indore, 2-5 Dec. 2015, ISBN: 978-81-903321-6-3 Article: CP-7.21
18. SERB School on "High intensity laser plasma interaction: theory and simulation" Indian Institute of Technology (IIT) Delhi, India (2014).
19. S. Chaurasia, **Vinay Rastogi,** R. K. Bhatia, V. Nataraju, D. S. Munda, S. M. Sharma, "Development of a high resolution and high dispersion Thomson parabola along with Time-of-flight detector for laser-plasma produced ions" 08 – 11 Jan. 2014 National Laser Symposium 22, MIT, Manipal, Karnataka
20. S. Chaurasia, **Vinay Rastogi,** R. K. Bhatia, V. Nataraju, S. M. Sharma, "Studies of Ions from Laser produced Carbon Plasma using Thomson Parabola Spectrometer" 3-6 Dec. PLASMA 2013, KIIT, Bhubneshwar

LIST OF REFERENCES

1. **Prof. June K. Wicks**
   Assistant Professor
   Hopkins Extreme Materials Institute
   Departments of Earth & Planetary Sciences, Mechanical Engineering
   Johns Hopkins University
   E-mail: wicks@jhu.edu

2. **Prof. M. N. Deo**
   Vice Chancellor Vinoba Bhave University, Hazaribag, India
   Head High Pressure & Synchrotron Radiation Physics Division (Retired)
   Bhabha Atomic Research Centre, Mumbai-400085, India
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3. **Prof. Surinder M. Sharma**
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   Institute of Shock Physics, Washington State University, USA
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