Curriculum Vitae: Prof. Sham S. Ravindranath

Professional Background:

Associate Professor / ***Assistant Professor***	Department of Polymer and Process Engineering, Indian Institute of Technology, Roorkee	*(2021 – Present)* / *(2015 - 2021)*
Material Scientist:	Royal Dutch Shell, Bitumen group, Bangalore, India	*(2011 – 2015)*
Analytical Scientist:	Celanese-Ticona, Kentucky, United States of America	*(2010 – 2011)*
Project Assistant:	National Chemical Laboratory, Pune, India	*(2003 – 2005)*

Academic Background

Doctor of Philosophy:	The Dept. of Polymer Science (**Ranked 2nd**), The University of Akron, Ohio, USA	*(2005 – 2010)*
Bachelor of Eng.:	Polymer Science and Technology, SJCE, Mysore	*(1999 – 2003)*

Areas of Expertise: Pavement Materials, Sustainability, High Performance Polymers, Polymer Blends, Composites, Rheology.

Total Publications: 35 Published + 4 Under review

Projects: Sponsored Research and Industry Consultancy: ≈ 140 Lakhs

Association in National-body: Member of PCD 6: BIS

1. Publication Details: *Citations: 1310, h-index: 15, i10-index: 17 (Google Scholar)*		**Quality, IF**
1.	"Influence of elevated storage temperature and duration of SBS modified binders on the performance of asphalt mix", Sohel Islam, Ayana Ghosh, G. D Ransingchung R. N*****, and ***Sham S. Ravindranath***, *Innovative Infrastructure Solutions*, In-Print.	Scopus
2.	"Inferior performance properties of thermoplastics modified asphalt binders and mixes compared to SBS modification", Akanksha Pandey, Sohel Islam, G. D Ransingchung R. N, and ***Sham S. Ravindranath****, *Indian Road Congress*, In-Print.	IRC
3.	"Imperative role of SBS molecular structure on the performance properties of modified binders and asphalt mixes', Sohel Islam, Sumit K. Singh, G. D Ransingchung R. N*****, and ***Sham S. Ravindranath***, *International Journal of Pavement Engineering, 2226290, V. 24, NO. 1, 2023*, DOI: https://doi.org/10.1080/10298436.2023.2226290	Q1, 4.1
4.	"Evaluation of rheological behavior of SBS modified binders: Significance of lower angular frequency", Akanksha Pandey, Sohel Islam, G. D Ransingchung R. N, and ***Sham S. Ravindranath****, *Indian Highways, 2023, September 2023.*	IRC
5.	"Comparing the performance of SBS and thermoplastics modified asphalt binders and asphalt mixes", Akanksha Pandey, Sohel Islam, G. D Ransingchung R. N, and ***Sham S. Ravindranath****. *Road Materials and Pavement Design, 369*, 24, *2023.* DOI: https://doi.org/10.1080/14680629.2023.2180999	Q1, 3.8
6.	"Evaluating the intermediate temperature properties of SB modified asphalt binders: Influence	Q2, Scopus

	of SB copolymer structure", Yogesh Kumar, Praveen Kumar, and ***Sham S. Ravindranath*,*** *International Journal of Pavement Research and Technologies (IJPRT), February 2023.* DOI: https://doi.org/10.1007/s42947-023-00283-1	
7.	"Performance evaluation of long term laboratory aged asphalt mixtures containing different different molecular structures of SBS copolymer", Sohel Islam, G. D Ransingchung R. N*****, and ***Sham S. Ravindranath***, *J. of Materials in Civil Engineering, 044023191, 35 (7), 2023*. DOI: https://doi.org/10.1061/JMCEE7.MTENG-15368	Q1, 3.6
8.	"Effect of Molecular Structure of SBS Polymer on Conventional and Rheological Properties of Modified Asphalt Binder: "Linear vs. Branched SBS Polymer", Yogesh Kumar, Praveen Kumar, and ***Sham S. Ravindranath****, Indian Road Congress, 2023, In-Print.*	IRC
9.	"Performance degradation during elevated storage temperature of SBS modified binders and Asphalt Mixes: Impact of SBS molecular structure", Sohel Islam, Sumit K. Singh, G. D Ransingchung R. N*****, and ***Sham S. Ravindranath***, *J. of Materials in Civil Engineering, 35 (3), 04022457, 2023*. DOI: https://doi.org/10.1061/(ASCE)MT.1943-5533.0004622	Q1, 3.6
10.	"Quantifying the effect of SBS molecular structure on the upper service temperature rheological properties of modified binders", Akanksha Pandey, Sohel Islam, G. D Ransingchung R. N, and ***Sham S. Ravindranath****, Construction and Building Materials, 352, 128826, 2022.* DOI: https://doi.org/10.1016/j.conbuildmat.2022.128826	Q1, 7.6
11.	"Elevated temperature rheological properties of styrene-butadiene-modified binders: Role of molecular structure", Yogesh Kumar, Akanksha Pandey, Praveen Kumar, and ***Sham S. Ravindranath*,*** *International Journal of Pavement Research and Technologies (IJPRT), August 2022.* DOI: https://doi.org/10.1007/s42947-022-00215-5	Q2, Scopus
12.	"Vital role of lower frequencies in the rheological evaluation of SBS modified binders", Akanksha Pandey, Sohel Islam, G. D Ransingchung R. N, and ***Sham S. Ravindranath****; *Materials and Structures, 55, 88, 2022.* DOI: https://doi.org/10.1617/s11527-022-01922-y	Q1, 4.8
13.	"Performance deterioration of SBS modified asphalt mix: Impact of elevated storage temperature and SBS concentration of modified binder", Sohel Islam, Sumit K. Singh, G. D Ransinchung R.N*****, and ***Sham S. Ravindranath***; *J. of Materials in Civil Engineering, 34, 04021475, 2022.* DOI: https://doi.org/10.1061/(ASCE)MT.1943-5533.0004092	Q1, 3.6
14.	"Effect of additives on the thermal stability of SBS modified binders during storage at elevated temperatures", Sumit Kumar, Akanksha Pandey, and ***Sham S. Ravindranath****; *Construction and Building Materials, 314, 125609, 2022.* DOI: https://doi.org/10.1016/j.conbuildmat.2021.125609	Q1, 7.6
15.	"Modification of asphalt binder by the blend of chemically grafted thermoplastics and SBS: Influence of blend composition, chemical grafting, sulphur content, and MFI value", Akanksha Pandey, Alok Sharma, and ***Sham Ravindranath****, Polymer Bulletin, 79, 7759, 2022.* DOI: https://doi.org/10.1007/s00289-021-03868-7	Q2, 2.9
16.	"Rheological analysis of performance grade rutting and fatigue cracking criteria in asphalt binders", Akanksha Pandey, Sumit Kumar, Sohel Islam, G. G Ransingchung, Sridhar Raju, and ***Sham Ravindranath****; *International Journal of Pavement Research and Technology, October 2021.* DOI: https://doi.org/10.1007/s42947-021-00113-2	Q2, Scopus

17.	"Effect of property deterioration in SBS modified binders during storage on the performance of asphalt mix", Sohel Islam, Sumit K. Singh, G.D. Ransingchung R.N*****, and ***Sham S. Ravindranath***; *Construction and Building Materials, 272, 121644, 2021.* DOI: https://doi.org/10.1016/j.conbuildmat.2020.121644	Q1, 7.6
18.	"Significance of frequency in quantifying the deterioration in the properties of SBS modified binders and rutting performance", Sumit K. Singh, Akanksha Pandey, Sohel Islam, GD Ransingchung R.N, and ***Sham S. Ravindranath****; *Construction and Building Materials, 262, 120872, 2020.* DOI: https://doi.org/10.1016/j.conbuildmat.2020.120872	Q1, 7.6
19.	"Laboratory evaluation of gap graded rubber modified warm mix asphalt", Sai Kubair, Waim A. Ravindra, Sridhar Raju*****, and ***Sham Ravindranath***; *IJPRT, 13, 558, 2020.* DOI: https://doi.org/10.1007/s42947-020-0317-4	Q2, Scopus
20.	"Fundamental limitations of performance grade rutting and fatigue cracking criteria of bitumen", Akanksha Pandey, Sumit K. Singh, Sridhar Raju, and ***Sham Ravindranath****; *Indian Highways, Indian Road Congress, March 2020.*	IRC
21.	"Effect of molecular structure and concentration of styrene-butadiene polymer on upper service temperature rheological properties of modified binders", Yogesh Kumar, Sumit K. Singh, Deepa Oberoi, Praveen Kumar, Paritosh Mohanty, and ***Sham S. Ravindranath****; *Construction and building material, 249, 118790, 2020.* DOI: https://doi.org/10.1016/j.conbuildmat.2020.118790	Q1, 7.6
22.	"Effect of hollow glass microsphere on the morphology, rheology, and crystallinity of short bamboo fiber-reinforced hybrid polypropylene", Rupam Gogoi, Nityanshu Kumar, Gaurav Manik*****, and ***Sham Ravindranath***; *The Journal of the Minerals, Metals and Material Society, 71, 548-558, 2019.* DOI: https://doi.org/10.1007/s11837-018-3268-3	Q2, 3.0
23.	"Thermal degradation of SBS in bitumen during storage: Influence of temperature, SBS concentration, polymer type and base bitumen", Sumit Kumar, Yogesh Kumar and ***Sham Ravindranath****; *Polymer Degradation and Stability, 147, 64, 2018.* DOI: https://doi.org/10.1016/j.polymdegradstab.2017.11.008	Q1, 5
24.	"Shear banding in entangled polymers in the micron-scale gap: A confocal-rheoscopic study", Pouyan Boukany, Shi-Qing Wang, ***Sham Ravindranath*** and L. James Lee*****; *Soft Matter, 11, 8058, 2015.* DOI: https://doi.org/10.1039/C5SM01429H	Q1, 4.0
25.	"Letter to the editor: Cone partitioned plate (CPP) vs. Circular couette", ***Sham Ravindranath***, Yang Wang, Shi-Qing Wang***** et al.; *J. of Rheology, 56, 675, 2012.* DOI: https://doi.org/10.1122/1.4708515	Q1, 4.4
26.	"How polymeric solvents control shear inhomogeneity in large deformations of entangled polymer mixtures", ***Sham Ravindranath***, Shi-Qing Wang***** et al.; *Rheo. Acta, 50, 97, 2011.* DOI: https://doi.org/10.1007/s00397-010-0507-0	Q2, 2.6
27.	"Homogeneous shear, wall slip, and shear banding of entangled polymeric liquids in simple-shear rheometry: A roadmap of nonlinear rheology", Shi-Qing Wang***, *Sham Ravindranath***, et al.; *Macromolecules, 44, 183, 2011.* DOI: https://doi.org/10.1021/ma101223q	Q1, 6.0
28.	"Banding in simple steady shear of entangled polymer solutions", ***Sham Ravindranath***, Shi-Qing Wang***** et al.; *Macromolecules, 41, 2663, 2008.* DOI: https://doi.org/10.1021/ma7027352	Q1, 6.0
29.	"Steady-state measurements in the stress plateau region of entangled polymer solutions", ***Sham***	Q1, 4.4

	Ravindranath and Shi-Qing Wang*****; *J. of Rheology, 52, 957, 2008.* DOI: https://doi.org/10.1122/1.2936869	
30.	"Universal scaling characteristics of stress overshoot in startup shear of entangled polymer solutions", ***Sham Ravindranath*** and Shi-Qing Wang*****; *J. of Rheology, 52, 681, 2008.* DOI: https://doi.org/10.1122/1.2899147	Q1, 4.4
31.	"Large amplitude oscillatory shear behavior of entangled polymer solutions: Particle tracking velocimetry", ***Sham Ravindranath*** and Shi-Qing Wang*****; *J. of Rheology, 52, 341, 2008.* DOI: https://doi.org/10.1122/1.2833453	Q1, 4.4
32.	"What are the origins of stress relaxation behaviors in step shear of entangled polymer solutions?", ***Sham Ravindranath*** and Shi-Qing Wang*****; *Macromolecules, 40, 8031, 2007.* DOI: https://doi.org/10.1021/ma071495g	Q1, 6.0
33.	"New theoretical consideration in polymer rheology: Elastic breakup in chain entanglement network", Shi-Qing Wang*****, ***Sham Ravindranath***, et al.; *J. of Chemical Physics, 127, 064903, 2007.* DOI: https://doi.org/10.1063/1.2753156	Q1, 3.5
34.	"Non-quiescent relaxation of entangled polymer liquids after step strain", Shi-Qing Wang*****, ***Sham Ravindranath***, et al.; *Physical Review Letters, 97, 187801, 2007.* DOI: https://doi.org/10.1103/PhysRevLett.97.187801	Q1, 9.1
35.	"Banding in entangled polymer fluid under oscillatory shearing", Prashant Tapadia, ***Sham Ravindranath*** and Shi-Qing Wang*****; *Physical Review Letters, 96, 196001, 2006.* DOI: https://doi.org/10.1103/PhysRevLett.96.196001	Q1, 9.1

2. ***Papers Under Review:***

1.	"Quantifying the effect of additives on the rheological properties of PMBs: Role of angular frequency", *International Journal of Pavement Engineering*, Q1.
2.	"Critical evaluation of PG rutting (G*/sinδ) and fatigue cracking (G*.sinδ) criteria in asphalt binders", *Materials and Structures, Springer*, Q1.
3.	"Vital role of vinyl content in enhancing the thermal stability of SBS modified binders", *Construction and Building Materials*, Q1.
4.	"Properties deterioration in Reactive Terpolymer modified binders during elevated temperature storage", Materials and Structure, *Springer*, Q1.

3. ***Conference Manuscripts*** *(Peer Reviewed)*

1.	Vital role of SBS molecular structure on the performance of laboratory aged asphalt mixture, 6th ICBMM, Barcelona, Spain, 2022
2.	Evaluation of the performance of asphalt mixture prepared with different molecular structure of SBS co-polymer, CTRG, Tiruchirappalli, India, 2021.
3.	Effect of storage temperature and storage duration on the performance of SBS modified bitumen and bituminous mixes, A.S.C.E, Kolkata, 2020.
4.	Property erosion in SBS modified binders during storage, Australian Asphalt Pavement Association (AAPA), Sydney Australia, 2019.

5.	Effect of polymer type and concentration on the high-temperature rheological properties of SBS modified binders, Australian Asphalt Pavement Association (AAPA), Sydney Australia, 2019.
6.	Rheological analysis of PG rutting criterion in polymer modified asphalt binders, Australian Asphalt Pavement Association (AAPA), Sydney Australia, 2019.
7.	Performance of reclaimed asphalt pavement (RAP) material in asphalt mixtures, Australian Asphalt Pavement Association (AAPA), Sydney Australia, 2019.

4. ***Conference Presentations, Workshop/Keynote/Invited Speaker/Book Chapter:***

Year 2021-2023:

- *Book Chapter*: PG grading of bitumen using capillary and Brookfield viscometers, Lecture Notes in Civil Engineering, Vol. 218, Chapter 26, 2022.
- *Presentation:* "Comparing the performance of SBS and thermoplastics modified asphalt binders and asphalt mixes", 10th European Asphalt Technology Association 2023, Poland.
- *Invited Speaker*: "Fundamentals of MSCR based specifications", DEFP-3 workshop, IIT Roorkee, 2023.

Year 2020:

Transportation Research Group (TRG), Bhopal India, 2020

- Determination of PG upper limiting temperature using capillary and Brookfield viscometers.
- Property deterioration in SBS modified bitumen during storage at elevated temperatures.

Key Note/Workshop

- AICTE sponsored online Workshop on "Emerging Technologies in Transportation Engineering for Sustainable Development", VBIT Hyderabad.
- Regional Workshop on "Quality Control, New Materials, and Techniques in Road Sector, IIT Roorkee.

Invited Speaker

- BITS-Pilani, Hyderabad Campus, Dept. of Civil Engineering
- Anton Paar's Webinar on "Oscillatory Shear of Polymer Modified Bitumen".
- Anton Paar's Webinar on "Application of Rheology in Bitumen and its Modification".

Year 2006-2009

American Physical Society (APS)

1. How do entangled polymer liquids flow? 2009.
2. Nucleation and growth of chain disentanglement in large amplitude oscillatory shear, 2006.

Society of Rheology (SOR)

3. Stress overshoot scaling in startup shear of entangled polymers, 2008.
4. Achieving steady-state in the stress plateau region of entangled polymer solutions, 2007.
5. Probing the origin of nonlinear velocity profiles in shear flow of entangled polymers, 2006.
6. Nonlinear behavior in oscillatory shear of entangled polymers, 2006.

- ***Posters***

1. Limitation of rutting criterion (G*/sinδ) in quantifying property erosion in polymer modified binders

during storage at elevated temperatures, Transportation Research Board (TRB), USA 2019
2. Fatigue behavior of reclaimed asphalt pavement SMA mixtures, TRB, USA 2019.
3. Rheological evaluation of performance grading criteria of bitumen, COMPFLU 2016, Pune.
4. A study of property erosion in polymer modified bitumen during storage, COMPFLU 2016, Pune.
5. Is there elastic yielding in the absence of edge effects? 2008.
6. Universal scaling in startup shear of monodisperse entangled polymer solutions, SOR 2007.
7. Identifying origins of stress relaxation in step strained entangled polymer solutions, SOR 2007.
8. Probing the crystallization behavior of LLDPE under shear, Macro 2004.

5. Research Funding:

Sponsor	Title	Year and Amount
SERB, DST	Understanding and mitigating property erosion in polymer modified bitumen during storage and transportation	2017, 38 Lakhs
IIT-Roorkee	Concentric cylindrical measuring geometry with peltier temperature controller for rheological analysis of complex fluids	2018, 40 Lakhs
Consultancy	Bitumen and Polymer Industries	60 Lakhs

6. Professional Experience:

1) Associate and Assistant Professor: Dept. of Polymer and Process Eng., IIT-Roorkee (2015 – Present)

Teaching Assignments: Polymer Rheology, Polymer Processing, Introduction to Polymer Science and Engineering, Polymeric Film and Fiber Technology, and Polymer Engineering Thermodynamics.

Administrative Role:

Faculty Advisor (Saharanpur Campus)	Security, Safety, Wellness Warden, Library and Xerox, Rheology and polymer processing laboratory.
Department Committee Member	Research Committee, Academic Committee, Faculty Search Committee, Purchase committee.

Ph.D. Supervision:

Student Name	Thesis Title	Status
Sumit K. Singh	Investigating property deterioration in SBS modified bitumen and mixtures during storage	Awarded
Yogesh Kumar	Effect of molecular structure and concentration of SBS on the properties of asphalt binders	Awarded
Akanksha Pandey	Rheological and conventional property evaluation of bitumen and polymer modified binders	Awarded
Sohel Islam	Effect of polymer molecular structure on the performance of asphalt mixture	Awarded
Alok Sharma	A novel method for determination of fatigue cracking in asphalt binders	4th Year
Shuvrajit Biswas	Effective utilization of waste materials in pavements using modified binders	2nd Year

2) Material Scientist: Bitumen-Asphalt group, Royal Dutch Shell, Bangalore (2011 – 2015)

- Lead projects in the area of bitumen-asphalt. Provide expertise in bitumen, rheology, and material science. The projects involve a blend of application related activities as well as fundamental study.

- Hands-on approach to project planning and execution, in close contact with the business representatives. Strong commitment to Health, Safety, and Environment.

3) Analytical Scientist: Celanese/Ticona, USA ***(2010 –2011)***

- Provide R&D, analytical support, and new method development to various product development groups, manufacturing, and Celanese sister divisions. "Hands-on" position required the operation of a wide variety of analytical equipment

4) Project Assistant: National Chemical Laboratory, India ***(2003 – 2005)***

- Studied the crystallization behavior of LLDPE melts using rheological, optical, and thermal analytical techniques. Developed physical setups to study the property of polymer melts during flow.

7. Doctoral Research: *(2005 –2010)*

- Advisor: Dr. Shi-Qing Wang, The University of Akron
- Thesis: How do entangled polymer liquids flow?
- Revealed for the first time shear banding in entangled polymer liquids upon nonlinear deformations (relevant to polymer processing, polymer structure-property relationship, crystallization, etc.).
- 12 peer-reviewed publications in high-impact international journals.

8. Awards and Recognitions:

- Prof. B. B. Pandey memorial award for outstanding paper by Indian Road Congress & IIT Kharagpur.
- Doctoral research nominated for the Frank J. Padden award in 2009 by the division of polymer science, American Physical Society.
- Research fellowship, The University of Akron.

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