Curriculum Vitae: Prof. Sham S. Ravindranath

Professional Backs	ground:				
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:	Complex Fluids Division, National Chemical Laboratory, India	(2003 – 2005)			
Academic Backgrou	Academic Background				
<i>Doctor of Philosophy:</i> The Dept. of Polymer Science (Ranked 2 nd), (2005 – 2010) The University of Akron, Ohio, USA					
Bachelor of Eng.:	Polymer Science and Technology, SJCE, Mysore	(1999 – 2003)			
Areas of Expertise:	Areas of Expertise: Bitumen-Asphalt, Rheology, Polymeric Materials, Pavement Materials				
Total Publications:	27 Published + 8 under review				
Projects : SERB_ECRG (38 lakhs), IITR_SMILE 2018 (40 Lakhs), Consultancy (25 Lakhs)					
Association in National-body: Member of PCD 6, BIS					

Publication Details: Citations: 1217, h-index: 14, i10-index: 14 (Google Scholar)		Quality, IF
1.	"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	01 7 6
	Sham S. Ravindranath*, Construction and Building Materials, 352, 128826, 2022.	Q1, 7.0
	DOI: https://doi.org/10.1016/j.conbuildmat.2022.128826	
2.	"Property erosion during storage of SBS modified binders and asphalt mixes: Impact of SBS	
	molecular structure", Sohel Islam, G. D Ransingchung R. N*, and Sham S. Ravindranath*, J.	Q1, 3.6
	of Materials in Civil Engineering, 2022, In-print.	
3.	"Elevated temperature rheological properties of styrene-butadiene-modified binders: Role of	
	molecular structure", Yogesh Kumar, Akanksha Pandey, Praveen Kumar, and Sham S.	Q2,
	Ravindranath*, International Journal of Pavement Research and Technologies (IJPRT), August	Scopus
	2022. DOI: https://doi.org/10.1007/s42947-022-00215-5	
	"Vital role of lower frequencies in the rheological evaluation of SBS modified binders",	
4.	Akanksha Pandey, Sohel Islam, G. D Ransingchung R. N, and Sham S. Ravindranath*;	Q1, 4.8
	Materials and Structures, 55, 88, 2022. DOI: https://doi.org/10.1617/s11527-022-01922-y	
	"Performance deterioration of SBS modified asphalt mix: Impact of elevated storage	
5.	temperature and SBS concentration of modified binder", Sohel Islam, Sumit K. Singh, G. D	01.26
	Ransinchung R.N*, and Sham S. Ravindranath; J. of Materials in Civil Engineering, 34,	Q1, 3.0
	04021475, 2022. DOI: https://doi.org/10.1061/(ASCE)MT.1943-5533.0004092	
6.	"Effect of additives on the thermal stability of SBS modified binders during storage at elevated	Q1, 7.6

	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		
	"Modification of asphalt binder by the blend of chemically grafted thermoplastics and SBS:		
7	Influence of blend composition, chemical grafting, sulphur content, and MFI value", Akanksha	02.29	
7.	Pandey, Alok Sharma, and Sham Ravindranath*, Polymer Bulletin, 79, 7759, 2022.	Q2, 2.9	
	DOI: https://doi.org/10.1007/s00289-021-03868-7		
	"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	Q2,	
8.	Sham Ravindranath*; International Journal of Pavement Research and Technology, October	Scopus	
	2021. DOI: https://doi.org/10.1007/s42947-021-00113-2		
0	"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.	01.76	
9.	Ravindranath; Construction and Building Materials, 272, 121644, 2021.	Q1, /.0	
	DOI: https://doi.org/10.1016/j.conbuildmat.2020.121644		
	"Significance of frequency in quantifying the deterioration in the properties of SBS modified		
10.	binders and rutting performance", Sumit K. Singh, Akanksha Pandey, Sohel Islam, GD	01.76	
	Ransingchung R.N, and Sham S. Ravindranath*; Construction and Building Materials, 262,	Q1, 7.0	
	120872, 2020. DOI: https://doi.org/10.1016/j.conbuildmat.2020.120872		
11.	"Laboratory evaluation of gap graded rubber modified warm mix asphalt", Sai Kubair, Waim A.	02	
	Ravindra, Sridhar Raju*, and Sham Ravindranath; IJPRT, 13, 558, 2020.	Q2, Scopus	
	DOI: https://doi.org/10.1007/s42947-020-0317-4	1	
	"Fundamental limitations of performance grade rutting and fatigue cracking criteria of bitumen",		
12.	Akanksha Pandey, Sumit K. Singh, Sridhar Raju, and Sham Ravindranath*; Indian Highways,	IRC	
	Indian Road Congress, March 2020.		
	"Effect of molecular structure and concentration of styrene-butadiene polymer on upper service		
12	temperature rheological properties of modified binders", Yogesh Kumar, Sumit K. Singh, Deepa	01 7 6	
15.	Oberoi, Praveen Kumar, Paritosh Mohanty, and Sham S. Ravindranath*; Construction and	Q 1, 110	
	building material, 249, 118790, 2020. DOI: https://doi.org/10.1016/j.conbuildmat.2020.118790		
	"Thermal degradation of SBS in bitumen during storage: Influence of temperature, SBS		
14	concentration, polymer type and base bitumen", Sumit Kumar, Yogesh Kumar and Sham	01.5	
14.	Ravindranath*; Polymer Degradation and Stability, 147, 64, 2018.		
	DOI: https://doi.org/10.1016/j.polymdegradstab.2017.11.008		
	"Effect of hollow glass microsphere on the morphology, rheology, and crystallinity of short		
15	bamboo fiber-reinforced hybrid polypropylene", Rupam Gogoi, Nityanshu Kumar, Gaurav	O2, 3.0	
15.	Manik*, and <i>Sham Ravindranath</i> ; <i>The Journal of the Minerals, Metals and Material Society,</i>		
	71, 548-558, 2019. DOI: https://doi.org/10.1007/s11837-018-3268-3		
	"Shear banding in entangled polymers in the micron-scale gap: A confocal-rheoscopic study",		
16.	Pouyan Boukany, Shi-Qing Wang, Sham Ravindranath and L. James Lee*; Soft Matter, 11,	Q1, 4.0	
	8058, 2015. DOI: https://doi.org/10.1039/C5SM01429H		
17.	"Letter to the editor: Cone partitioned plate (CPP) vs. Circular couette", Sham Ravindranath,	Q1, 4.4	

	Yang Wang, Shi-Qing Wang* et al.; J. of Rheology, 56, 675, 2012.	
	DOI: https://doi.org/10.1122/1.4708515	
	"How polymeric solvents control shear inhomogeneity in large deformations of entangled	
18.	polymer mixtures", Sham Ravindranath, Shi-Qing Wang* et al.; Rheo. Acta, 50, 97, 2011.	Q2, 2.6
	DOI: https://doi.org/10.1007/s00397-010-0507-0	
	"Homogeneous shear, wall slip, and shear banding of entangled polymeric liquids in simple-	
19.	shear rheometry: A roadmap of nonlinear rheology", Shi-Qing Wang*, Sham Ravindranath, et	Q1, 6.0
	al.; Macromolecules, 44, 183, 2011. DOI: https://doi.org/10.1021/ma101223q	
• •	"Banding in simple steady shear of entangled polymer solutions", Sham Ravindranath, Shi-	
20.	Qing Wang* et al.; Macromolecules, 41, 2663, 2008. DOI: https://doi.org/10.1021/ma7027352	Q1, 0.0
	"Steady-state measurements in the stress plateau region of entangled polymer solutions", Sham	
21.	Ravindranath and Shi-Qing Wang*; J. of Rheology, 52, 957, 2008.	Q1, 4.4
	DOI: https://doi.org/10.1122/1.2936869	
	"Universal scaling characteristics of stress overshoot in startup shear of entangled polymer	
22.	solutions", Sham Ravindranath and Shi-Qing Wang*; J. of Rheology, 52, 681, 2008.	Q1, 4.4
	DOI: https://doi.org/10.1122/1.2899147	
	"Large amplitude oscillatory shear behavior of entangled polymer solutions: Particle tracking	
23.	velocimetry", Sham Ravindranath and Shi-Qing Wang*; J. of Rheology, 52, 341, 2008.	Q1, 4.4
	DOI: https://doi.org/10.1122/1.2833453	
	"What are the origins of stress relaxation behaviors in step shear of entangled polymer	
24.	solutions?", Sham Ravindranath and Shi-Qing Wang*; Macromolecules, 40, 8031, 2007.	Q1, 6.0
	DOI: https://doi.org/10.1021/ma071495g	
	"New theoretical consideration in polymer rheology: Elastic breakup in chain entanglement	
25.	network", Shi-Qing Wang*, Sham Ravindranath, et al.; J. of Chemical Physics, 127, 064903,	Q1, 3.5
	2007. DOI: https://doi.org/10.1063/1.2753156	
	"Non-quiescent relaxation of entangled polymer liquids after step strain", Shi-Qing Wang*,	
26.	Sham Ravindranath, et al.; Physical Review Letters, 97, 187801, 2007.	Q1, 9.1
	DOI: https://doi.org/10.1103/PhysRevLett.97.187801	
	"Banding in entangled polymer fluid under oscillatory shearing", Prashant Tapadia, Sham	
27.	Ravindranath and Shi-Qing Wang*; Physical Review Letters, 96, 196001, 2006.	Q1, 9.1
	DOI: https://doi.org/10.1103/PhysRevLett.96.196001	

Papers Under Review:

1.	"Comparing the performance of SBS and thermoplastic modified binders and asphalt mixes", IJPRT.
2.	"Quantifying the effect of additives on the rheological properties of PMBs: Role of angular frequency",
	Construction and Building Materials.
3.	"Evaluating the intermediate temperature properties of SB modified asphalt binders: Influence of SB
	polymer structure", IJPRT.
4.	"Studying the performance properties of modified asphalt binder and mixes containing SBS copolymers
	with different molecular structures", IJPE
5.	"Performance evaluation of long term laboratory aged asphalt mixture: Impact of SBS molecular

	structure", J. of Materials in Civil Engineering, ASCE.
6.	"Impact of different SBS grades on the performance of modified binders under high temperature
	storage", Polymer, Elsevier.
7.	"Critical evaluation of PG rutting (G*/sin\delta) and fatigue cracking (G*.sinb) criteria in asphalt binders",
	Materials and Structures, Springer.
8.	"Effect of short-term and long-term storage on the morphological properties of SBS modified binders",
	Materials and Structures, Springer.

Conference, Workshop/Keynote/Invited Speaker:

- Vital role of SBS molecular structure on the performance of laboratory aged asphalt mixture, 6th ICBMM, Barcelona, Spain, 2022
- Evaluation of the performance of asphalt mixture prepared with different molecular structure of SBS co-polymer, CTRG, Tiruchirappalli, India, 2021

<u>Year 2020:</u>

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.

A.S.C.E, Kolkata, 2020

• Effect of storage temperature and storage duration on the performance of SBS modified bitumen and bituminous mixes.

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 "Application of Rheology in Bitumen and its Modification".

<u>Year 2019:</u>

Australian Asphalt Pavement Association (AAPA), Sydney Australia

- Property erosion in SBS modified binders during storage.
- Effect of polymer type and concentration on the high-temperature rheological properties of SBS modified binders.
- Rheological analysis of PG rutting criterion in polymer modified asphalt binders.
- Performance of reclaimed asphalt pavement (RAP) material in asphalt mixtures.

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.

Research Projects:

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, polymer, and pharma industries	2020-21, 25 Lakhs

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:

	Security and Safety-Saharanpur Campus, Wellness Warden-Saharanpur Campus, Library
Faculty Advisor	and Xerox-Saharanpur Campus, Rheology and polymer processing laboratory, Gender
	Advancement for Transforming Institutions (GATI), Departmental Website.
Mamban	Departmental Research Committee, Departmental Academic Committee, Faculty Search
Member	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	Awarded

	mixture	
Alok Sharma	A novel method for determination of fatigue cracking in asphalt	3rd Vear
Alok Sharma	binders	5 Teal
Shuvrojit Diewoo	Effective utilization of waste materials in pavements using modified	2nd Voor
Shuvrajit Diswas	binders	2 I Cal
2) Material Scientist, Pitumen Asphalt group Powal Dutch Shell Pangalore		(2011 2015)
2) Material Scientist: Diamen-Asphan group, Koyat Duich Sheit, Dangalore		(2011 - 2013)

Effect of polymer molecular structure on the performance of asphalt

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

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

Project Assistant: National Chemical Laboratory, India **4**)

polymer modified binders

Studied the crystallization behavior of LLDPE melts using rheological, optical, and thermal analytical techniques. Designed and developed physical setups to study the physical property of polymer melts during flow. Advisor: Dr. K Guruswamy

Doctoral Research: The University of Akron, Advisor: Dr. Shi-Qing Wang

- 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. •
- Doctoral research nominated for the Frank J. Padden award in 2009 by the division of polymer science, American Physical Society.

Sohel Islam

Email: sham.ravindranath@pe.iitr.ac.in, sham708@gmail.com

(2010 - 2011)

(2003 - 2005)

4th Year

(2005 - 2010)