

DR.-ING. DEBDIPTA BASU

Assistant Director
Indian Rubber Manufacturers Research Association, Govt. of India
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Area of Specialization:

Polymer Science and Engineering with specialization in Structure Property relationship of polymeric Materials, Function integration of Elastomeric Materials, Mechano -Adaptive Elastomers, Self - Healing Elastomers, Functional Elastomeric Blend and Composite Materials, Mechanical and Dynamic Mechanical properties of Elastomers

Academics:

- **Ph.D.:** in *Elastomer Engineering*: Technical University of Dresden, Germany (2015), *Summa Cum Laude*
- **M. Sc.** in *Materials Science*: Sardar Patel University, Gujarat (2009) % Marks obtained: 71.71
- **B.Sc.** in *Industrial Chemistry*: Calcutta University (2006) % Marks obtained: 78.25

Professional Work Experiences:

- **April 2018- till date: Assistant Director**, Indian Rubber Manufacturers Research Association, India
- **January 2017 - March 2018: Assistant Manager**, Wacker Metroarc Chemicals Pvt. Ltd., India
- **December 2015 - December 2016: Scientist**, Apollo Tyres Ltd., India
- **November 2016 – December 2016: Research Associate**, Leibniz Institute of Polymer Research, Dresden, Germany

Teaching Experiences:

- **Masters courses:**
 1. IPCHEM 357 Unit III; Carbon Nanotube and its applications to Masters Students at Indian Rubber Manufacturers Research Association in collaboration with University of Mumbai, India, August & September, 2019.
 2. RMST102 Compounding ingredients of rubber and polymers, to One-year certificate course Students at Indian Rubber Manufacturers Research Association, November & December, 2020

Publications:

- Peer-Reviewed Publications: **19**
- Paper presented in Conferences: **9**
- Book Chapter: **2**
- Patents: **1** (IP Filed)
- Invited Talks: **2**
- Total number of citations: **682**, h-index: **12** (Source: *Google Scholar*)

Patents

1. Sahoo S, Nawale M, Rajkumar K, Kapgate B, **Basu D**, Naik S, Shetty R, Bharti D, Bhowmick AK, "COCONUT NUT SHELL EXTRACT (CNSE) AS A MULTIFUNCTIONAL ADDITIVE IN RUBBER COMPOUNDS", Application number: TEMP/E-1 /16064/2019-MUM, Date submitted: 16th April 2019 (Indian Patent, IP Filed).
2. Sahoo S, **Basu D**, Bag S, Jagadale S, Rajkumar K, Nawale M, Tripathi R, "A BIO-BASED SEALANT FOR PUNCTURE PROOF TYRE", Application number: 201921009185, Date submitted: 8th March, 2019 (Indian Patent, IP Filed).

Scientific contribution in Polymer Science and Engineering:

- Exploring the area of Structure-Property relationship of Soft matters (Polymers, Elastomers)
- Explored Ionic elastomers for non-classical crosslinking to generate smart properties
- Developed Self-healing elastomer both at laboratory and industrial scales in real products like tyre
- Developed Ceramizable honeycomb structure like Silicon foam for GSLV & PSLV for VSSC, ISRO.
- Developed non-toxic, flame retardant and audited successfully silicone foam for railways and rocket applications
- Developed Mechanically-Adaptive Natural Elastomeric Materials by In-Situ Modification of Mineral Structures
- Developed New Nanostructured Mechano-adaptive Materials from Rubber and Thermoplastics.
- Developed bio-based sealant materials for making puncture proof tyre

- Explored in-situ generation of nanofillers like alumina, zirconia etc. in polymer matrix for multifunctional activities.
- Developed flame retardant novel and new filler namely layered double hydroxide for elastomeric system

Complete List of Peer-Reviewed Publication:

Articles in Journals:

1. Advances in layered double hydroxide (LDH)-based elastomer composites **D.Basu**, A.Das, K.W.Stöckelhuber, U.Wagenknecht, G.Heinrich **Progress in Polymer Science**, 39 (3), 2014, 594-626
2. Evidence for an in-situ developed polymer phase **D.Basu**, A.Das, K.W.Stöckelhuber, D.Jehnichen, P.Formanek, E. Sarlin, J.Vuorinen, G.Heinrich **Macromolecules**, 47(10), 2014, 3436 - 3450
3. Unmodified LDH as reinforcing filler for XNBR and the development of flame retardant elastomer composites **D.Basu**, J.J.George, A.Das, D.Y.Wang, U.Wagenknecht, K.W.Stöckelhuber, A.Leuteritz, B.Kutlu, G.Heinrich **Rubber Chemistry and Technology**, 87(4), 2014, 606-616
4. Fire-safe and environmentally friendly nanocomposites based on layered double hydroxides and ethylene propylene diene elastomer **D Basu**. A Das, D Y Wang, J J George, K W Stoeckelhuber, R Boldt, A Leuteritz, G Heinrich **RSC Advances**, 6(31), 2016, 26425-26436
5. Super thermoplastic vulcanizates based on carboxylated acrylonitrile butadiene rubber (XNBR) and polyamide (PA12) T Chatterjee, **D Basu**, A Das, S Wiessner, K Naskar, G Heinrich, **European Polymer Journal**, 78, 2016, 235-252
6. Ionic modification turns commercial rubber into a self-healing material, Amit Das, Aladdin Sallat, Frank Böhme, Marcus Suckow, **Debdipta Basu**, Sven Wießner, Klaus Werner Stöckelhuber, Brigitte Voit, Gert Heinrich, **ACS applied materials & interfaces**, 7(37), 2015, 20623-20630
7. Stearate modified zinc-aluminium layered double hydroxides and acrylonitrile buta diene rubber nanocomposites S.B.Eshwaran, **D.Basu**, B.Kutlu, A.Leuteritz, U.Wagenknecht, K.W.Stöckelhuber, K.Naskar, A.Das, G.Heinrich **Polymer-Plastics Technology and Engineering**, 53, 1, 2014, 65-73
8. Reinforced chloroprene rubber by in situ generated silica particles: Evidence of bound rubber on the silica surface, Bharat P Kapgate, Chayan Das, Amit Das, **Debdipta Basu**, Sven Wiessner, Uta Reuter, Gert Heinrich, **Journal of Applied Polymer Science**, 133(30), 2016
9. Rubber composites based on silane-treated stöber silica and nitrile rubber: Interaction of treated silica with rubber matrix B.P.Kapgate, C.Das, **D.Basu**, A.Das, G.Heinrich **Journal of Elastomers and Plastics**, 46, 2014
10. Naturally occurring amino acids: a suitable substitute of N-N" Di-phenyl guanidine (DPG) in silica tyre formulation S.Debnath, A.Das, **D.Basu**, G.Heinrich, **Kautschuk Gummi Kunststoffe**, 66, 2013, 25-31
11. Effect of sol-gel derived in situ silica on the morphology and mechanical behavior of natural rubber and acrylonitrile butadiene rubber blends B.P.Kapgate, C.Das, A.Das, **D.Basu**, U.Reuter, G.Heinrich **Journal of Sol-Gel Science and Technology**, 62, 2012, 501-509

12. Effect of silane integrated sol-gel derived in situ silica on the properties of acrylonitrile rubber
B.P.Kapgate, C.Das, **D.Basu**, A.Das, G.Heinrich **Journal of Applied Polymer Science**, (15), 2014
13. Exploring the role of stearic acid in modified zinc aluminum layered double hydroxides and their acrylonitrile butadiene rubber nanocomposites S.B.Eshwaran, **D.Basu**, S.R.Vaikuntam, B.Kutlu, S.Wiessner, A.Das, K.Naskar, G.Heinrich **Journal of Applied Polymer Science**, 132 (9), 2015, 41539
14. Compatibilization of natural rubber/nitrile rubber blends by sol–gel nano-silica generated by in situ method, Naresh D Bansod, Bharat P Kapgate, Chayan Das, Amit Das, **Debdipta Basu**, Subhas Chandra Debnath, **Journal of Sol-Gel Science and Technology**, 80 (2), 2016, 548-559
15. Controlled growth of in situ silica in a NR/CR blend by a solution sol –gel method and the studies of its composite properties, Naresh D Bansod, Bharat P Kapgate, Chayan Das, **Debdipta Basu**, Subhas Chandra Debnath, Kumarjyoti Roy, Sven Wiessner, **RSC Advances**, 5 (66), 2015, 53559-53568
- 16.Phase changing stearate ions as active fillers in multifunctional carboxylated acrylonitrile butadiene composite: Exploring the role of zinc stearate, Basu Debdipta, Agasty Airit, Das Amit, Chattopadhyay Santanu, Sahu Puspendu, Heinrich Gert, **Journal of Applied Polymer Science**, 136, 2019, 48271
- 17.Unusual low temperature relaxation behavior of crosslinked acrylonitrile-butadiene co-polymer **Debdipta Basu**, Shib Shankar Banerjee, Subhas Chandra Debnath, Mikhail Malanin, Lyaysan Amirova, Philippe Dubois, Gert Heinrich, Amit Das, **Polymer**, 212, 2020, 123309
- 18.Reinforcement effect of in situ developed itaconic acid based metal salt nano-crystals in acrylonitrile-butadiene copolymer , **Debdipta Basu**; Bharat Kapgate; Naresh Bansod; Kasilingam Rajkumar; Suchismita Sahoo; Chayan Das, **Rubber Chemistry and Technology** ,94 (3), 2021, 462–475.
- 19.Emerging advances in rubber technology by the suitable application of sol-gel science and technology , Kumarjyoti Roy; Subhas Chandra Debnath; **Debdipta Basu**; Aphiwat Pongwisuthiruchte; Pranut Potiyaraj, **Rubber Chemistry and Technology** 94 (4), 2021, 601–625.

Book Chapter:

Nanostructured ionomeric elastomers, **Debdipta Basu**, Amit Das, Klaus Werner Stoeckelhuber, Sven Wießner, Designing of Elastomer Nanocomposites: From Theory to Applications, Advances in Polymer Science, Springer, Volume – 275, 2016, 235-266

Articles in Books:

1. Layered double hydroxide (LDH) rubber nanocomposites **Debdipta Basu**, Amit Das, Gert Heinrich Invited contribution for a book chapter in "**Encyclopedia of Polymeric Nanomaterials, Kobayashi, Shiro; Müllen, Klaus (Eds.)** ", 2015 Springer
2. Rubber nanocomposites Amit Das, **Debdipta Basu**, Gert Heinrich Invited contribution for a book chapter in "**Encyclopedia of Polymeric Nanomaterials, Kobayashi, Shiro; Müllen, Klaus (Eds.)** ", 2015 Springer

Conferences:

1. Ionic cross-linking of carboxylated nitrile rubber (XNBR) with different zinc containing additives **D.Basu**, A.Das, K.W.Stöckelhuber, G.Heinrich **KHK 2012** (10th Fall Rubber Colloquium of DIK-Hannover), November-2012, Hannover, Germany (Proceedings)

2. Exploitation of Layered Double Hydroxide (LDH) – A multifunctional material in rubber **D.Basu**, A.Das, K.W.Stöckelhuber, G.Heinrich **ICRRM 2013** (International Conference on Rubber and Rubber-like Materials), March-2013, IIT Kharagpur, India (Proceedings)

3. Preparation and properties of flame retardant ethylene propylene di -ene rubber (EPDM) by Layered Double Hydroxides (LDH) **D.Basu**, A.Das, D.Y.Wang, J.J.George, K.W.Stöckelhuber, U. Wagenknecht, G.Heinrich **EUROMAT 2013** (European Congress and Exhibition on Advanced Materials and Processes), September-2013, Sevilla, Spain (Proceedings)

4. Unmodified LDH as reinforcing filler for XNBR and the development of flame retardant elastomer composites **D.Basu**, B.Kutlu, A.Das, A.Leuteritz, G.Heinrich **EUROMAT 2013** (European Congress and Exhibition on Advanced Materials and Processes), September -2013, Sevilla, Spain (Proceedings)
5. Phase Behaviour of carboxylated nitrile rubber A.Das, **D.Basu**, K.W.Stöckelhuber, G.Heinrich **POLYCHAR 22** April-2014, Stellenbosch, South Africa (Proceedings)
6. Block co-polymer like phase behavior in ionic elastomer **D.Basu**, A.Das, K.W.Stöckelhuber, D.Jehnichen, P.Formanek, G.Heinrich **ACS Rubber division, 186th technical meeting** October-2014, Nashville, TN, USA (Proceedings)
7. Existence of nano-scalic block co-polymer morphology in ionic elastomer **D.Basu**, A.Das, G.Heinrich **KHK 2014** (11th Fall Rubber Colloquium of DIK-Hannover), November-2014, Hannover, Germany (Proceedings)
8. Designing rubber nanocomposites for “green” and “smart” tire applications **D.Basu**, A.Das, G.Heinrich **Tire Technology Expo 2015** February-2015, Cologne, Germany (Proceedings)
[Speaker interview printed in the November issue of „Tire Technology International“ magazine \(p-12\) published by UKiP Media Events, UK](#)
9. Importance of Testing in Quality and Market Expansion, **Debdipta Basu, National Rubber Conference (NRC) 2018**, November – 2018, Kolkata

Invited Lectures

1. Under UGC faculty development program (125th Orientation Programme), the following series of lectures on 15/02/2019 at University of Calcutta, Rajabazar Campus with 75 faculty members (Fresh) at colleges and university across West Bengal were delivered -
 - i) Evolution of Rubber in Mankind
 - ii) Role of Fillers - Reinforcement and Property Enhancement
 - iii) Popular Rubber Products - History, Processing and Applications

Invited Reviewers:

Journal of Applied Polymer Science, Rubber Chemistry and Technology, Polymer Composites, Iranian Polymer Journal, Composites Part A & B, ACS Applied Polymer Materials

Awards and Recognitions:

- Ranked **First class First** in Calcutta University during B.Sc in Ramakrishna Mission Vidyamandira , Belur Math , Calcutta University.
- Hold **Distinction Marks (1st class 1st as well)** in M.Sc and recipient of **Gold Medal** from Sardar Patel University , Gujarat.
- Recipient of Prestigious **INSPIRE Fellowship** in the year of 2010 by Department of Science & Technology (DST), Govt. of India.
- Recipient of **Leibniz Scholarship** to work as a Ph.D student in the year of 2011 at Leibniz Institute of Polymer Research, Dresden, Germany
- Recipient of **DKG (German rubber society)** award for “outstanding thesis and contribution to rubber science and technology” in May, 2016 in **Marseburg, Germany.**

Personal Details:

Date of Birth: 16th January, 1985

Father's Name: Mr. Kaliprasanna Basu

Gender: Male

Marital status: Married

Nationality: Indian

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References:**Prof. Dr. Gert Heinrich**

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Declaration:

I, **DEBDIPTA BASU**, declare that all the information furnished above is true, correct and complete to the best of my knowledge and belief.



DEBDIPTA BASU