

MANUFACTURING AND MATERIALS FRONTIERS



Anil K. Bhowmick

Ph.D. – Indian Institute of Technology (IIT), Kharagpur
Post-doctoral research: The University of Akron, Akron, Ohio
Research Professor, William A. Brookshire Department
of Chemical and Biomolecular Engineering

Publications

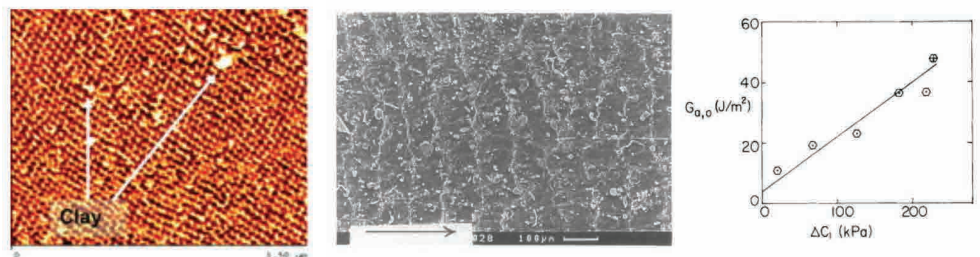
1. Natural rubber nanocomposites based on new fibrous nanofillers with improved barrier properties for use in tire innerliner applications, KP Surya, S Bhattacharya, R Mukhopadhyay, K Naskar, AK Bhowmick, *Rubber Chemistry and Technology*, 93(3), 471-497 (2020)
2. Sustainable self-healing elastomers with thermoreversible network derived from biomass via emulsion polymerization, P Sahu, AK Bhowmick, *Journal of Polymer Science Part A: Polymer Chemistry* 57 (6), 738-751 (2019)
3. Effect of Silica Loading and Coupling Agent on Wear and Fatigue Properties of a Tread Compound, H Sridharan, A Guha, S Bhattacharya, AK Bhowmick, R Mukhopadhyay, *Rubber Chemistry and Technology* 92 (2), 326-349 (2019)
4. An Insight into molecular structure and properties of flexible amorphous polymers: A molecular dynamics simulation approach, S Saha, AK Bhowmick, *Journal of Applied Polymer Science* 136 (18), 47457 (2019)
5. Influence of layered nanofillers on the mechanical properties and thermal degradation of polyacrylate polymer: Theoretical and experimental investigations, T Saha, AK Bhowmick, T Oda, T Miyauchi, N Fujii, *Composites Part B: Engineering* 169, 65-78 (2019)
6. Synthesis and Characterization of Phenol Furfural Resin from Moringa Oleifera Gum and Biophenol and Its Application in Styrene Butadiene Rubber, R Koley, R Kasilingam, S Sahoo, S Chattopadhyay, AK Bhowmick, *Industrial & Engineering Chemistry Research* 58 (40), 18519-18532 (2019)
7. Reactive grafting of 3-octanoylthio-1-propyltriethoxysilane in styrene butadiene rubber: Characterization and its effect on silica reinforced tire composites, S Das, S Chattopadhyay, S Dhanania, AK Bhowmick, *Polymer* 179, 121693 (2019)

Patent Application

1. Saha Tuhin, Bhowmick Anil K., Miyauchi T., Fujii N., *Acrylic Rubber Composition*, Published Japanese Patent Application No. JPWO2018008473A1

Dr. Bhowmick is a nationally and internationally recognized academician and researcher in polymer science and engineering. He is the first Asian to receive the Chemistry of Thermoplastic Elastomers Award (2002) and the George Stafford Whitby Award (1997) for his outstanding research and teaching from the Rubber Division, American Chemical Society. His recent awards include the TRiLA Academician of the Year Award by Tyre Times (2016), the Distinguished Visitor Award by the University of Auckland, New Zealand (2019), the Fred E. Schwab International Education Award by the Society of Plastics Engineers, USA (2019), the Distinguished Alumnus Award by IIT, Kharagpur (2019), and the Syed Husain Zaheer Medal (2020) by the Indian National Science Academy. Dr. Bhowmick is a Fellow of the Indian National Academy of Engineering, Indian National Science Academy, Indian Rubber Institute, and West Bengal Academy of Science & Technology.

At the Cullen College of Engineering, Dr. Bhowmick's research interests include polymer nanocomposites and nanomaterials, thermoplastic elastomers and polymer blends, molecular dynamic simulation of polymers, new and novel sustainable polymers from renewable sources, polymer modification, rubber technology, failure and degradation of rubbers, adhesion and adhesives, waste rubber recycling, sustainable polymers from renewable sources, and self-healing and smart polymers.



POLYMER BASED MATERIALS

Dr. Bhowmick's research focuses mainly on the development of novel series of polymer based nanocomposites that have properties that are better than the original nanoparticle or polymer. He has chosen a number of nanoparticles namely, clay, nanotubes, graphene, etc. and a wide variety of polymers ranging from non-polar to polar structures in his research. He conducts in-depth studies associated with materials such as tensile, tear, dynamic mechanical, barrier, thermal, and rheological properties and studies of the applications of these nanocomposites. Dr. Bhowmick's research team has recently developed an eco-friendly tire with enhanced fuel efficiency, better safety, and improved mileage by using new generation advanced materials.

Thermoplastic elastomers, a class of materials that can be processed at high temperatures like plastics but show rubbery behavior like elastomers at room temperature, have been exhaustively investigated by Dr. Bhowmick and his team in their efforts to develop a series of novel materials.

Dr. Bhowmick's research for novel sustainable polymers is focused on the following three dimensions: (a) development of new polymers by replacing fossil-derived ones, (b) reuse of waste rubbers & plastics, and (c) development of energy efficient technology in rubber processing. His outstanding work in the development of tank track pad and rubberized road wheel, tube expander, seals and diaphragm for chemical drum closers, flue duct expansion joints, belt and pinch roller for tape deck systems, electron beam crosslinked cable and energy products, and low rolling resistant compounds for conveyor belts, rubber covered rolls for the steel industry and eco-friendly tires are especially noteworthy.

