

CURRICULUM VITAE

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Education:**Ph.D (Polymer Material chemistry)**

University of Hyderabad, School of Chemistry, Hyderabad, India

M.Sc (Organic Chemistry)

Osmania University, Hyderabad, India.

B.Sc ((Mathematic, Physics, Chemistry)

Osmania University, Hyderabad, India.

Research Expertise: Polymer synthesis and structure-property analysis, synthesis of various nanomaterials, surface modifications, polymer nanocomposites, polymer formulation and melt processing, scale-up processing, halogen free flame retardants, hydrophobic/super hydrophobic materials, especially polyurethanes, water-borne polyurethanes, emulsion polymerizations for coating and painting, adhesives, antibacterial, biodegradable and packaging applications. Moreover, fire retardants for coatings/paintings and polymer composites applications.

Profile snapshot: Result oriented, skill in new Product Development with good interpersonal communication, Knowledge in polymer formulations & processing, scale-up, writing scientific reports etc.

1. Senior Researcher: (Jan-2019-to date):**The current projects working on as follows related to product development:**

- Development of strong FR for recycled PP, PET and PE, scale-up for commercial applications.
- Preparing hydrophobic/super hydrophobic, Janus type of clay-based materials, lab scale and master batch for calendaring coating applications.
- Also working on producing multilayers eco-friendly shrink-wrap films for packaging applications.
- Developing methods for thermoplastic cellulose based materials for marine applications.

2. Post-doctoral Researcher (May-2017-to Dec-2018):

- Synthesis of various inorganic nano material based halogen free fire retardant (HFFR) such as polyphosphazenes and cyclotriphosphazene, melamine polyphosphate, melamine cyanurate, metal oxides, metal phosphates, metal sulfides, layered double hydroxides and its combinations applied for various polymers (PU, PLA, PA6, PP, PET and HDPE) to improve the fire retardant property, and polymer processing, impact modifiers, and scale-up etc.

3. Ph. D. Research work (Dec-2010 to June-2016):

- Polyurethanes: Water-borne coatings, synthesis of various waterborne PUs and its nano composites, PU-acrylate latex, castor oil and crinol oil based water born PUs etc.
- Emulsion polymerization: Synthesis of polystyrene and various polyacrylates with varying the monomers, initiator and surfactant concentrations etc.

- Synthesis of different structural polymers, silica cross-linked polymers, siloxane-PU, structure-property relationship, biodegradable PU, shape memory PUs, propellant binders etc.
 - Hydrophobic/super hydrophobic polymers for water proofing coatings (solvent free/water-borne).
- 4. Project assistant work (Jun-2009 to Dec-2010):**
- Worked on polymeric energetic binders with enhanced burning rate of rocket propellants.
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LIST OF PUBLICATIONS: (Total-13 papers and one book published)

- (1) Particle-size dependent properties of sulfonated polystyrene nanoparticles. Mousumi Hazarika, **Kuruma Malkappa**, Tushar Jana. *Polym. Int.* **2012**, *61*, 1425-1432.
 - (2) Simultaneous improvement of tensile strength and elongation: An unprecedented observation in case of HTPB polyurethanes. **Kuruma Malkappa**, Tushar Jana. *Ind. Eng. Chem. Res.* **2013**, *52*, 12887–12896.
 - (3) Hydrophobic, water dispersible polyurethane: Role of polybutadiene diol structure. **Kuruma Malkappa**, Tushar Jana. *Ind. Eng. Chem. Res.* **2015**, *54*, 7423–7435.
 - (4) Functionalized polybutadiene diol based hydrophobic, water dispersible polyurethane nanocomposite: Role of organoclays structure. **Kuruma Malkappa**, Billa Narasimha Rao, Tushar Jana. *Polymer*, **2016**, *99*, 404-416.
 - (5) Organic/Inorganic hybrid nanocomposites of water dispersible polyurethanes with antibacterial activity. **Kuruma Malkappa**, Billa Narasimha Rao, G. Suresh, Ch. Venkata Ramana, Tushar Jana. *Colloid Polym Sci*, **2018**, *296*, 95–106.
 - (6) Enhanced thermo-mechanical stiffness, thermal stability and fire retardant performance of surface modified 2D MoS₂ nanosheet-reinforced polyurethane. **Kuruma Malkappa**, Suprakas Sinha Ray, Neeraj Kumar. *Macromol. Mater. Eng.* **2018**, 1800562
 - (7) Ferrocene grafted hydroxyl terminated polybutadiene: A binder for propellant with improved burn rate. Billa Narasimha Rao, **Kuruma Malkappa**, Nagendra Kumar, Tushar Jana. *Polymer*, **2019**, *163*, 162-170.
 - (8) Thermal Stability, Pyrolysis Behavior, and Fire-Retardant Performance of Melamine Cyanurate@Poly(cyclotriphosphazene-co-4,4'-sulfonyl diphenol) Hybrid Nanosheet-Containing Polyamide 6 Composites. **Kuruma Malkappa** and Suprakas Sinha Ray. *ACS Omega*, **2019**, *4*, 9615-9628.
 - (9) Supramolecular Poly(cyclotriphosphazene) Functionalized Graphene Oxide/Polypropylene Composites with Simultaneously Improved Flame Retardancy, Thermal and Rheological Properties. **Kuruma Malkappa**, Reza Salehiyan, Suprakas Sinha Ray. *Macromol. Mater. Eng.* **2020**, 2000207.
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Books:

- (1) Halogen-Free Flame-Retardant Polymers - Next-generation fillers for polymer nanocomposite applications. **Kuruma Malkappa** and Suprakas Sinha Ray. **Springer nature book; ISBN 978-3-030-35490-9.**

Patent:

- (1) Development of halogen free flame retardant for recycled polymers. **Kuruma Malkappa**, Vincent Ojijo, Jayita Bandyopadhyay, Suprakas Sinha Ray. *(Plan to prepare a draft for patent application).*
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Expertise in handling modern equipment's such as UV-Vis spectrometer, FT-IR, NMR, TGA, DMA, TMA, DSC, SWAXS, TG-FTIR/PyGC-MS, AFM, SEM, TEM, UTM, Particle Size Analyzer (PSA), Contact Angle (CA), Rheometer, Cone colorimetry and UL-94.

NAME OF REFERENCE:

<p>Prof. Suprakas Sinha Ray Director and chief Researcher, DSI/CSIR National Centre for Nanostructured Materials, CSIR Pretoria 0001, South Africa Tel.: +27 12 841 2388 (O), Mob No: +27 794980405 E-mail: rsuprakas@csir.co.za; ssinharay@uj.ac.za;</p>	<p>Dr. Vincent Ojijo Principal Researcher, DSI/CSIR-Chemicals and clusters, Pretoria 0001, South Africa Tel.: +27 12 841 3360 (O), Mob No: +27 795011595 Vojijo@csir.co.za;</p>	<p>Prof. Tushar Jana, School of Chemistry University of Hyderabad Hyderabad-500 046, INDIA. Phone: +91-40-23134808 (O), Mob No: +91-9440127016 Email: tusharjana@uohyd.ac.in ; tjscuoh@gmail.com</p>
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Research work some highlights:

- Generally water-borne PUs (WPU) are not stable for longer time, but which we synthesised HTPB/HTPB-DNB based WPUs are *highly stable approximately 3 years* (under normal laboratory conditions there is no separation and no solidified) which shown in below image are satisfied the coating material properties, and advantage is able to store longer time.
- The material containing combined properties such as the *fire retardant and hydrophobicity/super hydrophobicity* are also more useful for *coatings, painting, and polymer composite applications*, which can protect from fire, corrosion, antifouling etc. Below shown in the figure, multi-functionalised graphene nano sheets (PSGO) and m-PZS, exhibited excellent water resistant and fire retardant activity for PA6 and PP polymer composites. In addition, we applied various FRs such as APP, LDH, MCA, PZS, Metal oxides and other combinations for different polymers and studied.
- *APP, MPP, MCA and LDH* are majorly using for *flame retardant coatings*.

