GEORGE VARGHESE P J

M.Tech student – Materials Science and Engineering

Polymer Science and Technology Laboratory (PSTL)
Department of Metallurgical and Materials Engineering
Indian Institute of Technology (IIT) Patna
India – 801106

+91-9446345045

vpjgeorge@gmail.com

Research interest

- Synthesis of carbonaceous nanofillers like graphene and graphene like materials
- Graphene and nanoclay based polymer nanocomposite
- Polymer blends
- Biomaterials

Education

2019 – till date

M.Tech in Materials Science and Engineering

Indian Institute of Technology (IIT), Patna
CGPA: 8.8 (out of 10) (till 3rd semester)
Courses:

- Advanced materials characterization techniques
- Nanostructured materials
- Rubber science and technology
- Surface engineering
- Materials processing technology
- Structural and functional properties of materials
- Composite science and technology

2013 - 2017

B.Tech in Polymer Science and Engineering

Cochin University of Science and Technology (CUSAT), Kerala, India
CGPA: 8.06 (out of 10)
Courses taken:

- Polymer composites and blends
- Polymer processing
- Polymer rheology
- Polymer physics
- Tyre technology
- Polymer synthesis and manufacture

2011 - 2013

Kerala State Higher Secondary Board
HSE (10+2)
Total: 94.25%

2010 - 2011

Board of Public Examinations, Kerala
SSLC (class 10)

M.Tech project

2020 - 2021

Thesis title (major project): **Large scale synthesis of few layers graphene using low shear mixing machineries**

Supervisor: Dr. Dinesh Kumar Kotnees, Assistant Professor, Department of Metallurgical and Materials Engineering, Indian Institute of Technology (IIT) Patna
Co-supervisor: Dr. S. Sivaram, Honorary Professor and INSA Senior Scientist, Indian Institute of Science Education and Research (IISER), Pune, India

Summary: The first part of this work involves the exploration of new machineries for the synthesis of few layer graphene mainly via mechano-chemical route. The shear of each machines was calculated and ranked accordingly. **The second part** of this work is the synthesis of few layers graphene (FLG) from each machine and their characterization. The extend of exfoliation and generation of defects, after subjecting to shear, was monitored for each process. **The third part** of the project involves the validation of FLG synthesized in a polymer matrix. The FLG are incorporated in polymer and the physico-mechanical properties of the nanocomposites are observed.

2020 - 2021

Thesis title (minor project): **Fuller's earth: a low-cost potential nanoclay for preparation of rubber nanocomposites**

Supervisor: Dr. Dinesh Kumar Kotnees, Assistant Professor, Department of Metallurgical and Materials Engineering, Indian Institute of Technology (IIT) Patna

Summary: The work attempts to explore the reinforcement effect of fuller's earth nanoclay in improving the physio-mechanical properties of nitrile rubber, polybutadiene rubber, and ethylene propylene diene rubber.

B.Tech project

2016 - 2017

Thesis title (major project): **Studies on effect of flame retardants in polyurethane based inhibition systems for solid rocket motor**

Supervisor: Mr. S. Ratheesh, Scientist/Engineer SF, Propellant Engineering Division (PED), Vikram Sarabhai Space Centre (VSSC), Indian Space Research Organization (ISRO), Trivandrum, India.

Summary: Solid rocket motor is one of the most established and reliable chemical propulsion system of ISRO, India's prestigious space agency. Inhibitors provide controlled burning of the solid rocket propellent, which plays an important role in the trajectory of the spacecraft. The present inhibitor systems are synthesized from natural resources, which shows inconsistent properties and poor ageing resistance, and also with carcinogenic materials. The project mainly focuses on the replacement of the natural material with the same polymeric material used as solid propellent and substitute the carcinogenic materials with non-carcinogenic material without any compromise in the properties of inhibitor system.

2015 - 2016

Thesis title (minor project): **Surface functionalized nanocellulose derived from Agave americana – a potential candidate for biomedical application**

Supervisor: Prof. Sailaja G.S, Department of Polymer Science and Rubber Technology, Cochin University of Science and Technology (CUSAT).

Summary: First part is the extraction of nanocellulose from Agave americana, a natural source and a potential substitute for synthetic fibres, via chemical treatments. **Second part** is the in-situ procedure for surface functionalization of extracted nanocellulose followed by it's characterization to monitor the bio-compatibility.

Work Experience

2017 - 2019

Assistant Manager – Mixing and 4-roll calender, Manufacturing Technology, CEAT Ltd. *(Flagship company of RPG group)* | 22 months experience

- Technical in-charge of compounding
- Increased the straight pass ratio (efficiency) of banbury internal mixer to 98.5%

- Implemented barcode in raw materials, compound and finished goods for Manufacturing Execution System (MES)
- Executed seasonal specification to stabilize the compound properties like tackiness and Mooney viscosity
- Fine tuning of mixing sequence based in the incoming raw materials
- Executed trails on raw material development and new source validation of existing raw materials
- Modified the oil charging sequence to optimize the mixing time and compound properties

Graduate Engineer Trainee – Product Development (PCR-UVR), R&D, CEAT Ltd.

- Developed an indoor testing protocol in flat-trac machine for the estimation of relaxation length of passenger car/utility vehicle radial tires
- Corelated indoor test results of relaxation length with the outdoor test results of ride and handling
- Reduced the product development lead time (by 25%) by the implementation of relaxation length test in flat-trac machine
- Reduced the product development cost (outdoor testing) by 40%

Publications

N.S. Sumitha, S. Sreeja, **P.J. George Varghese**, G.S. Sailaja., "Magnetic and pH dependent delivery of doxorubicin: a dual functional drug delivery system for chemotherapy", under review in **Materials Chemistry and Physics, 2021** (manuscript number: MATCHEMPHYS-D-21-00940)

George Varghese P. J, Deepthi Anna David, Anas Karuth, P. M. Sabura Begum, Jinu Jacob George, Bakhtiyor Rasulev, Prasanth Raghavan, "Non-Woven Polypropylene-Nitrile Rubber Blend: A Novel Method for the Recycling of Medical Face Mask to an Engineering Product" (manuscript in pipeline)

Skills

- Raman Spectroscopy
- X-ray Diffraction (XRD)
- Transmission Electron Microscopy (TEM)
- Field Emission Scanning Electron Microscopy (FESEM)
- Fourier Transform Infra-Red spectroscopy (FTIR)
- Differential Scanning Calorimetry (DSC)
- Thermo Gravimetric Analysis (TGA)
- Dynamic Mechanical Analysis (DMA)
- Universal Testing Machine (UTM)
- Rheometers
- Rubber mixing – Two roll mixing mill, Haake internal mixer, Brabender internal mixer, Banbury internal mixer

Language proficiency

Malayalam (Mother tongue)
Hindi
English (Medium of instruction from kindergarten to PG)
TOEFL

- Overall score: 102 (out of 120)
- Reading: 25 (out of 30) - Advance
- Listening: 28 (out of 30) - Advance
- Speaking: 26 (out of 30) – Advance
- Writing: 23 (out of 30) – High intermediate

Software skills

Origin
Microsoft Excel
Microsoft PowerPoint
Microsoft Word
C++
SAP

Administrative skills

Head Coordinator – Training and Placement Cell (TPC), IIT Patna
Executive member – Society of Polymer Technologist (SPOT)

Reference

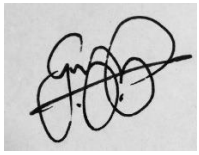
Dr. Dinesh Kumar Kotnees
Assistant Professor
Department of Metallurgical and Materials Engineering,
Indian Institute of Technology (IIT) Patna,
India
Mobile: +91-80511-00995; +91-99555-36022
Landline: +91-6123028185
E-mail: dinesh@iitp.ac.in; dineshvnr@gmail.com

Prof. Prasanth Raghavan
Department of Polymer Science and Rubber Technology,
Cochin University of Science and Technology (CUSAT),
India
Mobile: +91-94972-03532
Email: dr.prasanthr@gmail.com; prasanth@cusat.ac.in

Dr. S. Sivaram
Honorary Professor and INSA Senior Scientist,
Former Director, CSIR-NCL, Pune,
Indian Institute of Science Education and Research (IISER),
Dr. Homi Bhabha Road,
Pune – 411008, India
Contact: +91-20 25908434
Mobile: +91-9860799954
Email: s.sivaram@iiserpune.ac.in

Declaration

I, hereby declare that all the above-furnished details are true and unbiased to the best of my knowledge.



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