

An Indian-Australian research partnership

Project Title: Dispersion of Graphene bundle (intercalated / exfoliated graphite) in Polyester and structure – property correlation

Project Number IMURA0392

Monash Main Supervisor
(Name, Email Id, Phone) Prof. Mainak Majumdar
mainak.majumder@monash.edu *Full name, Email*

Monash Co-supervisor(s)
(Name, Email Id, Phone) Prof. Tuncay Alan
tuncay.alan@monash.edu

Monash Head of Dept.
(Name,Email) Prof. Chris Davies
chris.davies@monsh.edu.au *Full name, email*

Monash Department: Mechanical & Aerospace Engineering

Monash ADRT
(Name,Email) Prof. Emmanuelle Viterbo *Full name, email*

IITB Main Supervisor
(Name, Email Id, Phone) Prof. Arup Bhattacharya
arupranjan@iitb.ac.in *Full name, Email*

IITB Co-supervisor(s)
(Name, Email Id, Phone)

IITB Head of Dept
(Name, Email, Phone) Prof. Prabhu N *Full name, email*

IITB Department: Metallurgy and Material Sciences

Research Academy Themes:

Highlight which of the Academy's Theme(s) this project will address?

(Feel free to nominate more than one. For more information, see www.iitbmonash.org)

1. Advanced computational engineering, simulation and manufacture
2. Infrastructure Engineering
3. Clean Energy
4. Water
5. Nanotechnology
6. Biotechnology and Stem Cell Research

The research problem

Define the problem

Graphene-polymer nanocomposites (GPNs) exhibit unique properties which can find lot of potential applications in niche market. The properties of polymer nanocomposites depend strongly on how well Graphene is dispersed into the polymer matrix.

- **Preparation of Graphene** - Nano scale (0.35 nm – 1 nm thickness) dispersion of Graphene platelets starting from exfoliated / intercalated Graphite in polyester matrix
 - **Processing – morphology – properties study**
 - ✓ Effect of Graphene orientation on properties (CTE, electrical, barrier etc.)
 - ✓ Flow induced orientation (injection molding vs. compression molding)
 - ✓ Annealing and its effect on properties
 - ✓ Study of crystallization behavior
 - ✓ Degree and rate of crystallization and its effect on properties
 - ✓ Correlating mechanical, electrical, thermal, barrier and rheological properties to
 - ✓ Nano dispersion of Graphene bundle
- Concentration of Graphene

Project aims

Define the aims of the project

Expected outcomes

Highlight the expected outcomes of the project

How will the project address the Goals of the above Themes?

Describe how the project will address the goals of one or more of the 6 Themes listed above.

Capabilities and Degrees Required

List the ideal set of capabilities that a student should have for this project. Feel free to be as specific or as general as you like. These capabilities will be input into the online application form and students who opt for this project will be required to show that they can demonstrate these capabilities.

Masters in Materials Science (optionally Chemistry / Physics) with good understanding of polymer structure - property correlations

Potential Collaborators

Please visit the IITB website www.iitb.ac.in OR Monash Website www.monash.edu to highlight some potential collaborators that would be best suited for the area of research you are intending to float.

