



PROCESS FOR FABRICATING HETEROSTRUCTURES WITH TWO-DIMENSIONAL MATERIALS

IITM TECHNOLOGY AVAILABLE FOR LICENSING

Problem Statement

- Heterostructure fabrication with 2D materials is complex and costly, hindering scalability.
- Current methods lack precision in aligning layers.
- A simplified, cost-effective, and precise process is needed for easier exploration of 2D materials' potential.

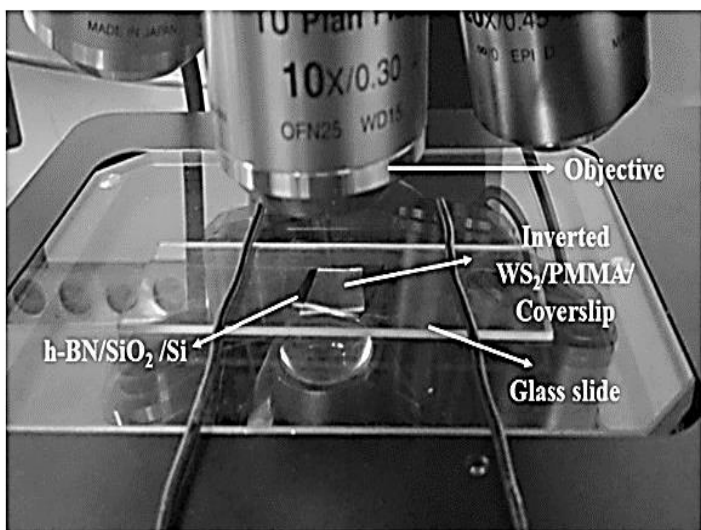
Technology Category/Market

Category – Materials Science and Nanotechnology

Applications – Electronics system, Photonics, Sensors

Industry – Photonics, Electronics, Sensors technology

Market -Advanced materials is likely to be a US\$10 billion market in India by 2028. Advanced materials market was valued at US\$5 billion in 2021 and is expected to grow at a **CAGR of about 10-12%**.



TRL (Technology Readiness Level)

TRL- 4-5 Technology validated in relevant environment

Research Lab

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Intellectual Property

- IITM IDF Ref. 2373
- IN 444786 (PATENT GRANTED)

Technology

Simplified Heterostructure Fabrication:

The technology simplifies the fabrication of heterostructures using two-dimensional materials, such as h-BN and WS₂.

PMMA Coating:

It involves the application of a PMMA (poly methyl methacrylate) solution to create a film on the substrate, which serves as a crucial step in the process.

Mechanical Exfoliation:

The invention utilizes mechanical exfoliation, employing adhesive tape, to obtain two-dimensional material flakes.

Substrate Cleaning:

Successive cleaning of the substrates using acetone, isopropyl alcohol, and deionized water ensures a clean surface for material deposition.

Manual Alignment:

Precise alignment and positioning of the two-dimensional materials are achieved manually, without the need for expensive micromanipulators, making the process cost-effective and accessible.

CONTACT US

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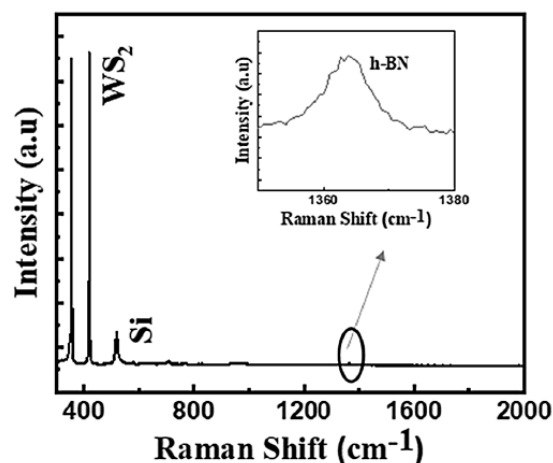
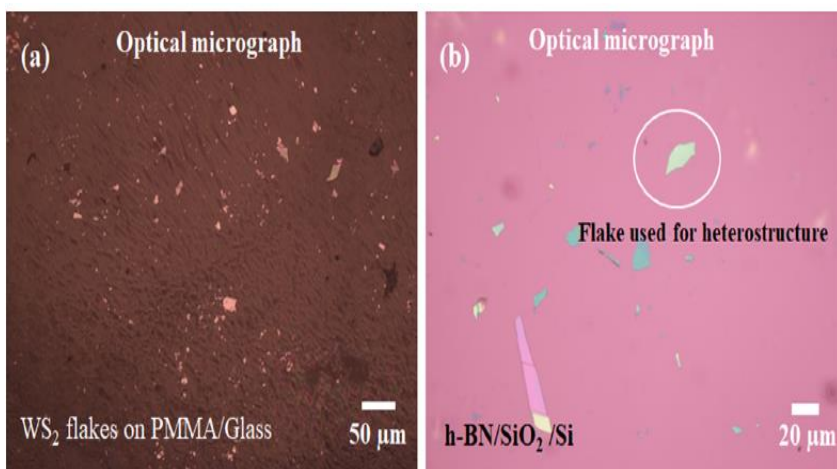
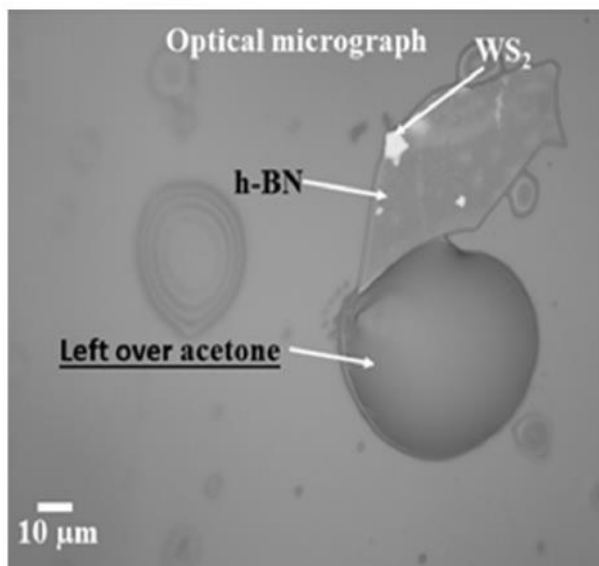
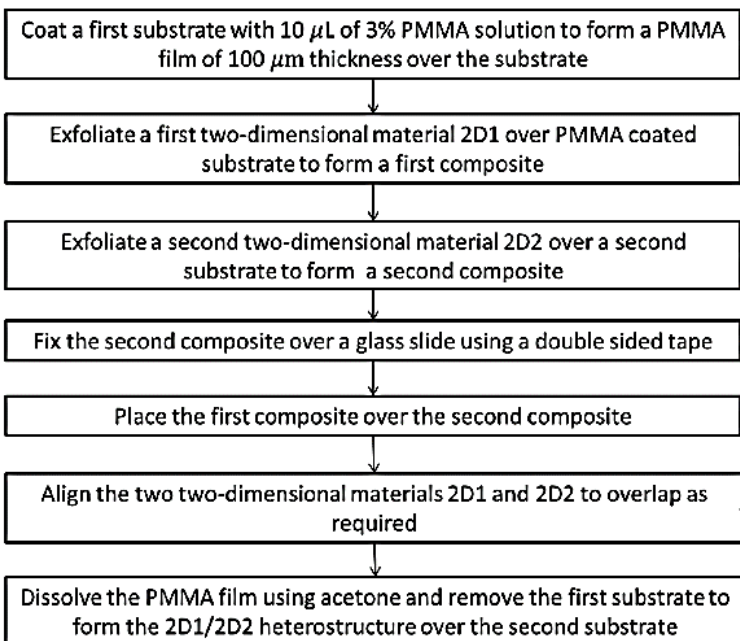
Key Features / Value Proposition

Technical Perspective:

1. Simplified fabrication of 2D material heterostructures.
2. Enhanced control in aligning different 2D materials.

User Perspective:

1. Improved accessibility and cost-effectiveness for researchers.
2. Greater control for studying new properties and applications.



Figures 1 and 2A-2D depict the fabrication process of two-dimensional heterostructures, while Figures 3-6 show the optical micrograph, alignment, and characterization of the WS₂/h-BN Heterostructure.

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