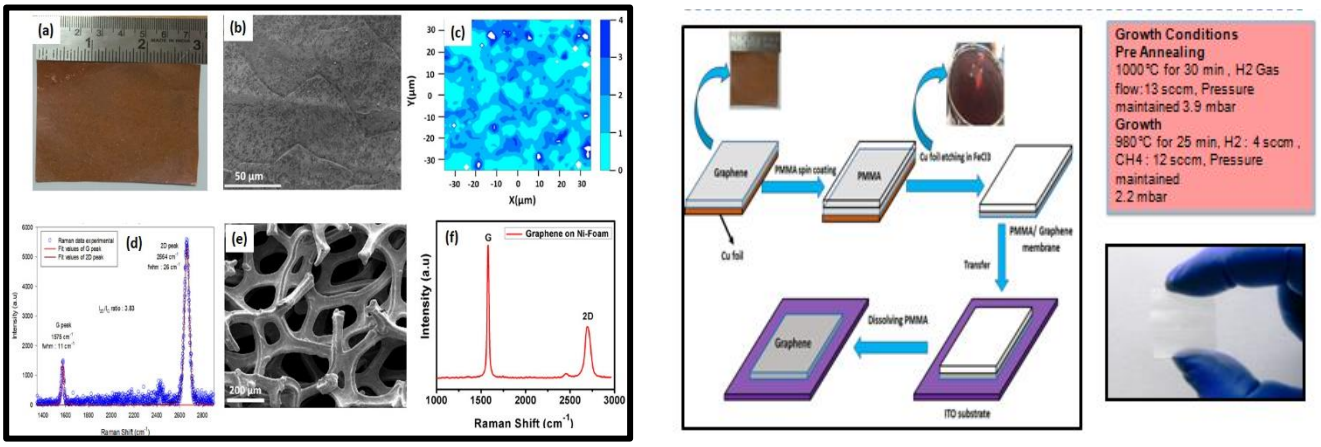
Rapid Thermal Processing - Chemical Vapour Deposition (RTP-CVD) of Graphene

WP: 3.4 **TRL: 4/5**



(a) Photographic image, (b) FESEM image (c) I2D/IG mapping and (d) Raman Spectra, of high-quality single layer graphene, (e) FESEM image and (f) Raman Spectra of graphene grown on NI-foam. Schematic of the graphene transfer process with inset of actual images of our optimized transfer pictures.

Specific Features of Technology Developed (Benchmarking USP) (in bullets)**:**

Highly scalable process for producing high-quality single layer graphene on Cu foils by Rapid Thermal Process (RTP) Chemical Vapor Deposition (CVD) technique. The Raman spectrum shows typical features of monolayer graphene, e.g., ~ 3.83 I2D/IG ratio and a symmetric 2D band centered at ~2664 cm-1 with a FWHM of ~26 cm-1. From the optical and FESEM images we can clearly observed that single layer high quality graphene is uniformly grown on copper foil.

Technical Details and TRL:

- A RTP-CVD processes for growing single, Turbostatic Bi-Layer & MultiLyaer graphene on Cu foils as direct use for thermal management applications.
- A clod walled CVD processes, demonstrated upto 4 inch size, scalable to larger size.

Graphene transfer process:

Optimized the process for single layer graphene to transparent substrates. which will be beneficial for developing graphene based applications on electronics, energy, lubrication, etc. CVD growth of graphene on Cu foils, we carry out PMMA thin films using spin coater. We have the graphene films on the desired substrate/surface, which can be used in many applications.

Applications of Technology and Impact:

Graphene has incurred intense interest since its first isolation in 2004, and with the vast array of unique properties like high mechanical flexibility, large surface area, chemical stability, superior electric and thermal conductivities that render them great choices as alternative electrode materials for electrochemical energy storage systems and materials for nanogenerators. We have also prepared porous graphene on Ni foam in ambient condition. This graphene foam will used as electrode for electrochemical energy storage materials and sea water desalination.

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