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TUTORIAL TOPIC:

Graphene and layered materials: Growth by a simple CVD Technique

TUTORIAL:

Since the report of ambipolar conduction in graphene flakes obtained by exfoliation (Science, 2004) graphene has come a long way from being a scientific novelty to being considered for commercial device applications. This has mainly been enabled by the ability to also grow graphene over large areas by chemical vapour deposition (Science 2009). Graphene is now not the only 2-D material of interest. The di-chalcogenides, such as MoS_2, constitute another family of emerging materials that are also layered and possess a wide range of properties that make them interesting for next generation electronic and opto-electronic applications.

The tutorial will include:

- Description of the method for preparing graphene flakes by exfoliation. A desk will be set up that will allow participants to test their skills at exfoliating and separating atomic layers of graphene.
- Description of the method for preparing graphene by chemical vapour deposition
- Description of methods to characterize the graphene deposited.
- Description of methods to separate graphene and the underlying growth substrate
- All of the above for MoS_2

PROFILE:

Srinivasan Raghavan a Materials Scientist by training. He works at the interface between Materials and Devices. The research in his group specializes in understanding the mechanisms of crystal growth and thereby controlling the stress, defects and microstructure of the solid material deposited during the growth state itself. He then collaborates with scientists and engineers from other backgrounds to understand the correlation between material stress and microstructure, its properties and device performance.

Material systems that are currently under investigation include stress engineered oxides on Si and Ge for system on chip applications by sputtering and pulsed laser deposition methods, development of new materials for next generation solar cells, GaN and its alloys with AlN and InN for high power electronics by metalorganic chemical vapour deposition and layered materials such as graphene and di-chalcogenides for future electronic and optoelectronic applications.

An active area of effort in his lab also includes indigenous fabrication of reactors and vacuum systems for enabling the research described.