

Industrial Graphene Growth and Transfer – Challenges and capabilities

Mira Baraket

General Graphene Corporation, 10239 Cogdill Road, Knoxville, TN, USA

Mira@generalgraphenecorp.com

Graphene is a monolayer of sp^2 -bonded carbon atoms assembled in a honeycomb lattice structure that has attracted incredible attention for its many promising properties. It has been said that Graphene can do anything you need - except get out of the laboratory. The CVD-grown large area graphene has yet to become useful outside the laboratory due to its cost which is usually well over \$10,000 dollars per square meter. Consequently, graphene's accessibility has been severely restrained with virtually no chance to integrate into industrial applications requiring high product volumes. To address this, General Graphene has scaled-up the graphene growth using an atmospheric pressure CVD process to produce cost effectively truly large-scale mono and multilayers graphene. This led us to produce different graphene types from polycrystalline graphene grown on polycrystalline copper to single oriented grown on single oriented copper to various forms of multilayer. All this can be produced with a single machine with production rates exceeding $>30,000 \text{ m}^2/\text{year}$. Now that costs and production are in line with industrial applications – the final step is to integrate graphene into targeted applications where its unique properties and abilities provide significant competitive advantages. On the other hand, there is not a single transfer method that works for all applications. This leads to a variety of transfer methods, each with their strengths and weaknesses.

In this talk a brief history of graphene will be presented with emphasis on the challenges faced in growth and transfer along with current state-of-the-art applications with real-world performance and cost data.