Graphene one-page proposal summary – ISF 2024

Graphene is a material that is extracted from graphite and is made up of pure carbon, a single layer of graphite.

[A complex process (of chemical vapor deposition - CVD)](http://www.graphenea.com/pages/cvd-graphene) using toxic chemicals to grow graphene as a monolayer is typically used. However, although there are few production methods none of them proved to be efficient enough to upscale production for vast commercial needs and thus pulls up dramatically its price.

**In this study I intend to** demonstrate that the usage of a Gyrotron generating high power millimetric wave radiation over raw material (Carbon Black) can:

* Transform a significant amount of the raw material to Graphene.
* Produce high quality thin layer Graphene.
* Reduce the time needed for production dramatically with no toxic materials involved

**Methodology**

Based on the experience we have using the Gyrotron for other applications, we intend to expose the raw materials (Carbon based materials such as Carbon Black powder) to different pulse time width and pulse power within the millimetric wave range. Once we achieve steady repeatable method, we would go further to enrich the Graphene purity by using additional catalysators.

**Expected contribution**

Graphene's vast potential usage from one hand and the lack of efficient production methods from the other hand present a challenge to the research team to come out with a new break-through production method. The contribution of fast high-quality Graphene production to numerous applications is outstanding. Assuming positive results of our research, it would lead to a breakthrough production method to be widely used in the relevant industries:

* 1. High-frequency electronics and Optical Electronics (Ultra-wide bandwidth photodetectors)
  2. Bio, chemical and magnetic sensors
  3. Energy storage and generation
  4. Replacing silicon in high-performance electronic devices.
  5. Composite Materials