

# A DIFFERENT ANGLE

Canada Graphene is home to the patent holder of the method for industrial scale production of graphene and here explains its benefits

**H**ello, my name is Henry Famenini. I am a practising pharmacist in Canada. I am also the inventor and the patent holder (USA Patent Number: 9,005,565 B2) of 'the method for industrial scale production of graphene'. Prior to my invention, the biggest problem was finding a method to manufacture graphene inexpensively and in large quantities; therefore, a large number of teams of research scientists all over the world have been working very hard to find a solution to the problem.

So far, the scientists have failed to "deliver". The questions are: Why? What are the reasons for their failure?

The answer: A brief analysis, followed by a thorough examination of the published scientific papers, revealed that the main reason for the failure is that the scientists have employed the wrong methods to solve the problem.

At first glance, the different methods employed by the scientists appeared to be diverse and vary greatly from one another; however, upon closer investigation, it became abundantly clear that it was not so, i.e. the various methods employed were merely different variations of two archetypal methods, namely: a) 'cutting out' (or isolating) a single sheet of carbon atoms from a chunk of, e.g., pure graphite (using chemical means); or b) 'building up' a sheet of pure carbon atoms from scratch (e.g. by chemical vapour deposition).

Both of the above archetypal methods have serious drawbacks, making them impractical for our purposes (graphene production).

## So, how did the new invention manage to solve the problem?

The problem was solved when I discovered a new archetypal method. The discovery of the third archetype was made possible after I started to look at the problem from a different angle, which led me to find a solution that fit my new perspective.

A brief explanation of the invention – the invention/method comprises three simple steps: 1) producing a Langmuir monolayer;<sup>1</sup> 2) mounting/transferring the said monolayer onto a substrate; and 3) controlled carbonisation (burning) of the said monolayer. It is during the controlled carbonisation step that the conversion of the Langmuir monolayer to a sheet of graphene takes place.

Background information (see Wikipedia): A Langmuir monolayer is a one-molecule-thick layer of an insoluble organic material (e.g.



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olive oil) spread onto the surface of water. Such monolayers are easily produced (using an 'Langmuir-Blodgett trough')<sup>2</sup> and then transferred (or mounted) onto substrates.

The genius of the new method is that using a monolayer literally ensures that the final product can only possess a single-layer structure i.e. that of graphene (see below).

The explanation: As the starting material (in step one) consists of a single layer, the final product must also be single layered; in other words, a monolayer would not suddenly produce a multi-layered final product; therefore, controlled carbonisation of a monolayer sheet can only result in a single-layered sheet where the final product is pure carbon atoms (in a single-layered sheet), i.e. graphene.

The invention offers many other benefits, e.g. producing inexpensive graphene, because a) the materials required to produce graphene are cheap; b) there is no need for expensive set-up, e.g. a 'clean, particle-free room'; and c) there is no need for highly skilled operators, i.e. anyone with minimal education can be trained in no time to run the production.

What is the final challenge I need to overcome? As mentioned above, I am a pharmacist (i.e. I am not associated with a university or an institution); therefore, at present, I have very limited access to a laboratory, making the process of scaling-up painfully slow.

For a more thorough explanation of anything outlined above, for more information about my invention, or to contact me with any questions, please refer to my website which can be found in the attributions below.

1 <https://en.wikipedia.org/wiki/Monolayer>

2 [https://en.wikipedia.org/wiki/Langmuir%E2%80%93Blodgett\\_trough](https://en.wikipedia.org/wiki/Langmuir%E2%80%93Blodgett_trough)



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