Q&A between Dexter Johnson at Graphene Council and Jon Mabbitt from Applied Graphene Materials

Question

1. **The development of Applied Graphene Materials from university research to an AIM-traded business is a story that many lab research groups working with graphene and other 2D materials would like to duplicate. What were a few of the most important factors that contributed to the success of your company bridging that gap between the lab and the fab?**

Answer

1. Universities provide a fantastic environment in which to be creative, but often ideas do not progress beyond a single experiment or perhaps being the topic of a research paper. In our case the close connection between the Inorganic Chemistry department at Durham University and the Technology Transfer office facilitated the opportunity for the manufacturing processes to be financially supported. Without this early stage investment the ideas would probably have gone no further, but with seed capital and self-belief the people involved at this stage were able to deliver proof-of-concept. Another significant step was that the inventor recognised they were not necessarily best placed to lead the company going forwards and was comfortable enough to pass on the responsibility to an experienced growth management team.

Question

2. **Your corporate literature describes your production of graphene as a "bottom-up" process. Is this a chemical vapor deposition process or some kind of chemical exfoliation process? And do you see your process being adapted in some way that it could be used to produce monolayer graphene for electronic or optoelectronic applications in larger capacities than they are currently?**

Answer

2. We describe our process as "bottom up" because we synthesise our graphene and do not exfoliate it from graphite. However, this is not a CVD process because we do not require a substrate on which to deposit the vapour. It is a chemical decomposition of alcohol which is then reassembled to create the graphene nanoplatelets.

Question

3. **It would seem that your current business model is that of a producer of graphene dispersions that supplies different product manufacturers to further enable their products? Do you see your business model evolving over time where you move further up the supply chain and eventually you would be manufacturing the products that are sold rather than the dispersions?**

Answer

3. Our strategy is very simple: make graphene and format it. We only want to produce graphene and supply it in a format that can be easily handled by our customers and easily incorporated into their products. It is our customers who will create end products. Clearly by this approach working extremely closely with our customers is mutually beneficial to enable the optimum results

Question

4. **In your own business lines, what applications are showing the most potential for growth, i.e. coatings, composites, functional fluids, etc.? And why do you think this is the case? The underlying markets did not have any solution to the issues that the graphene-enabled products offered, or the graphene-enabled product outperformed what was currently in the market?**

Answer

4. One of the Achilles heels of start-up companies is that they try to do too much. We have identified specific areas where we know our graphene material delivers particular benefits and so for now we remain focused on those areas: coatings (barrier performance), composites (mechanical performance) and functional fluids (friction modification). All sectors are looking for improvements, normally performance enhancement or cost reductions. The particular attributes graphene brings is that you get a lot of performance for very little quantity added. The ultra-high surface area to weight ratio combined with the chemical composition and bonding regime of graphene makes it super interesting. However, not all graphene is produced equally and the method of manufacture dictates the resultant properties of the material. Also whilst graphene has several attributes they cannot all be delivered concurrently in certain applications.

Question

5. **In your dealings with customers, what is typically their biggest reservation in adopting your graphene dispersions and how do you typically overcome these doubts?**

Answer

5. To gain customer interest you must provide credible data to support your assertions. Industrial companies will not spend time on technology concepts that are unproven. Once we have grabbed their attention then we need to support the customer really closely – things will go wrong before they go right and so a dogged mentality is essential. You also need to demonstrate that your business will continue to exist and be able to supply the products repeatedly and consistently in the long term.

Question

6. **What do you think the overall market for graphene needs in order to see wider development of graphene-enabled products, i.e. more defined industry standards, just more time in the market, manufacturing costs to go lower? If all of these and more, which is the most acute.**

Answer

6. I don't believe there is or will be a distinct market for graphene, moreover graphene be adopted largely as an additive to enhance a range of materials across several existing markets sectors. I don't subscribe to the idea that standardisation will enable acceptance. Graphene is, and will remain for many years to come, a specialty chemical and exist in many different forms. There are some issues where a common approach would be beneficial for all, such as regulatory controls and H&S. Everyone involved in graphene needs more application successes and to achieve this there needs to be a bolder commitment from producers and advisors to go and make it happen.