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Dear Science and Technology Committee,

I wish to offer you a unique perspective for your inquiry into graphene. This is based on my unusual relationship with Manchester University as a collaborating and “profit sharing” inventor.

Things went wrong with our relationship in the months preceding the isolation of graphene when I insisted on problems relating to research and financial fraud being tackled.

Unfortunately, the University tried to hide the problems instead of facing up to them.

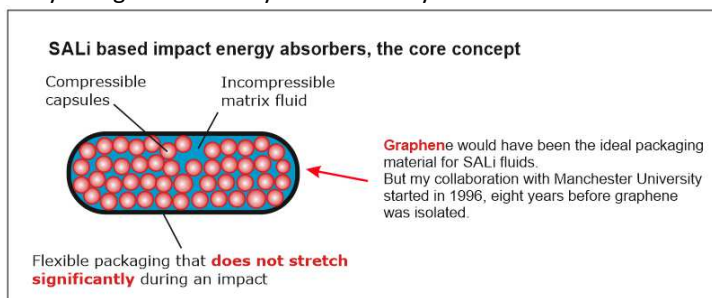
As a consequence, opportunities to exploit graphene more effectively within the UK have been lost

Even at this late stage, it is still possible to rescue something positive from these earlier events.

It is with this positive perspective in mind that I make my submission.

Overview of this submission

- In 1986, while working as a physics teacher in Manchester I invented a crash protection mechanism that I refer to as **Shock Absorbing Liquid** or **SALi Technology**. I lived frugally for ten years building up the funds that would allow me to work full time developing SALi. During those years I spent most Saturday mornings in the patents section of Manchester Central Library teaching myself the subtleties relating to patent law.
- Essentially, SALi Technology consists of an elastic fluid that has to be retained inside a tough flexible package. Graphene would appear to be the ideal tough packaging material. However, I cannot make claims based on first hand knowledge because my resolute opposition to fraud has resulted in my being ostracised by the University.



In addition to its incredible strength, graphene has good heat conduction and antibacterial properties. This would make it ideal for use in body armour, especially for sports and energetic professional activities [for example, body armour for British troops in the Middle East.]

- **The graphene patent trap** I will explain how the failure to file graphene patents before the first Manchester graphene paper was published, places future UK graphene product development in jeopardy. **But** I will also explain how combined **graphene-SALi** products escape the graphene patent trap.

- Four years before the isolation of graphene, Manchester University received £250,000 to help me develop several applications for SALi. The most important of these was to create a “PedSALi” car bumper to meet pending EU pedestrian safety legislation that was scheduled to come into force in 2005.
- The aim of the PedSALi project was to create a “smart” car bumper that would solve the so called “conflict of stiffness problem”. That is, be a soft bumper for pedestrian leg impacts, but stiff for non-human impacts where the bumper’s job was to protect the car bodywork.
- Unfortunately the University research was fraudulent. The PedSALi project collapsed and with no alternative solutions to the conflict of stiffness problem, the EU legislation was postponed. For the last 12 years I have been spending my time trying to get the University to recognise the fraud so that the research can be done properly and we can move on.
- This holdup means that opportunities to combine graphene with SALi, to create radically new products for manufacturing here in the UK, have been lost.
- My SALi patents were very broadly written and the wording of the patent claims would have offered protection to combined **graphene-SALi** products even before the first graphene paper was published.
- I was keen to support Manchester University so I voluntarily handed over commercial negotiating rights and 50% of royalties to the University. Here is an extract from the agreement.

3.3 Unless otherwise agreed for specific projects MIL shall negotiate exploitation arrangements with third parties relating to the IPR on behalf of the Company. MIL on behalf of the University shall pay to the Company fifty per centum (50%) of any and all revenues received by MIL from third parties arising from any such exploitation of IPR or University IPR or any combination thereof. For the avoidance of doubt such percentage shall be calculated prior to MIL deducting its expenses incurred as part of such exploitation.

MIL was the business arm of the pre-amalgamation Manchester University.

The fact that I handed over negotiating rights to the University means that Manchester University had the final say on where SALi products would have been manufactured.

I quite happily locked myself into an agreement that prevented me from shifting manufacturing of SALi based products to lower cost Far Eastern counties.

- I am committed to supporting British innovation and wanted to gain something positive out of my difficult Manchester experiences. What I have learned is published on three different pages on my company website. I will provide links to these pages in Section 1 below.
- In Section 3 below, I will draw the Committee’s attention to opportunities for claiming intellectual property rights for combined **graphene-SALi** products to help create manufacturing industry jobs in the UK. I will give one example of where obtaining a new patent would be difficult, and one where the unique range of graphene properties makes a new patent possible.

1 Three web pages that may be of interest to the Committee.

1.1 “The graphene patent trap”

I was astonished by the failure to file patent applications before the first graphene paper was published. I was particularly frustrated because I had the materials science experience and patent writing skills to have prevented this from happening. But Manchester University was more interested in using its solicitors, Eversheds to distract my MP from asking awkward questions about the SALi research fraud, rather than employing my skills.¹

In a remote attempt to try and stem the intellectual property loss to the UK economy I published advice on what I had learned during my ten years of patent study.

My advice can be found at www.cheshire-innovation.com/sali/SALi%20and%20graphene.htm

¹Evidence and sample Eversheds letter at www.cheshire-innovation.com/sali/CrashSALi-Project.htm

Summary of the graphene patent trap

- (i) Suppose the academic gossip is that a new application for graphene looks possible.
- (ii) A foreign competitor responds by filing a cunningly written patent to provide blanket protection for this class of graphene products. This can be based purely on intelligent guesswork; no expensive research has to be done.
- (iii) In accordance with international patent laws, the details of this patent application remain secret until about eighteen months after the patent has been filed.
- (iv) Meanwhile, the academics have obtained funding to investigate their idea. They do all of the clever lab work and come up with a viable product. They belatedly file a patent and publish their research in a journal paper.
- (v) At the last possible moment, the foreign patent holder reveals their patent and claims all manufacturing rights for the product.

How combined **graphene-SALi** product research avoids the patent trap

I have been filing broadly written SALi patents for the last twenty years. Most of these have now lapsed. However, on the plus side, this prevents foreign competitors writing blanket patent applications for this class of products in the future.

1.2 “Innovation apps”

One of the conclusions I drew from my Manchester experiences was that the British science establishment appears to rank hiding fraud higher than supporting innovation.

In an attempt to redress the balance in favour of innovation I make a number of suggestions at http://www.cheshire-innovation.com/other/safer_motoring.htm

1.3 “Science under attack”

The research fraud that I have been a victim of seems to be part of a far larger international problem.

I publish a series of recommendations for making research fraud less rewarding on the following page http://www.cheshire-innovation.com/other/science_under_attack.htm

My hope is that Britain will regain its reputation as a home for research integrity by adopting measures similar to those that I propose.

2

Case study

How suppression of research fraud is holding back the development of combined graphene-SALi products for the automobile industry

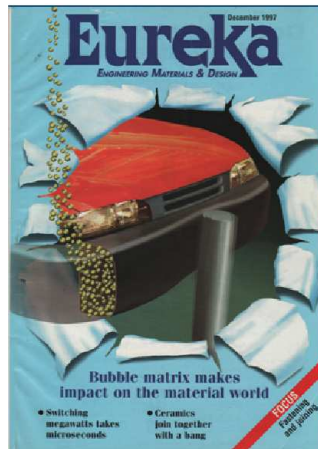


Figure 1. This is an early (1997) artist's illustration of what a SALi filled car bumper would look like. Today, a bumper fascia incorporating graphene would be the preferred choice, assuming mass production brought the graphene price down. But, at this earlier time, we had to make do with plastic.

As you can see, one of the automobile industries fears at the time was that in using conventional plastic car bumper fascia materials, the SALi fluid would leak out during a violent collision.



Figure 2. The EPSRC awarded the pre-amalgamation Victoria University of Manchester £212,000 to work with Cheshire Innovation and Dow Chemicals to develop the PedSALi car bumper.

The PedSALi project is referred to in Hansard at

<http://www.publications.parliament.uk/pa/cm200102/cmhansrd/vo011025/text/11025w18.htm>

The commercial prize on offer was massive because my own early research results had verified that a SALi filled car bumper would have had “smart” properties. That is, it would be soft for pedestrian leg impacts, while remaining stiff for potentially bodywork damaging impacts involving street furniture or other vehicles.

At the time this article was written, research into SALi was being done at both of the Manchester Universities that were on the verge of amalgamation.

[These Universities were the Victoria University of Manchester (VUoM) and UMIST.]

The SALi research at VUoM was poor and dogged by self interest. In contrast, the SALi research at UMIST was excellent.

Unfortunately, research rivalry problems between the two Universities combined with unease about my pending fame and fortune resulted in research fraud at VUoM and the collapse of the PedSALi project.

I explain what went wrong at www.cheshire-innovation.com/sali/pedsali.htm .

3 Regaining the graphene patenting initiative by combining it with SALi

By combining these two branches of materials science, it may be possible to create a new generation of patents to help keep some graphene based industries WITHIN THE UK.

You cannot gain a patent simply by combining two existing inventions and calling it a new one. Some novel creative step that is not obvious to the skilled engineer needs to emerge for a patent to be granted. Fortunately, the unique range of properties of graphene combined with my specialist knowledge of writing SALi patent applications means that in limited cases this may be possible.

Legal note: Once an invention has been revealed in the public domain it cannot be patented. So, to keep within patent law, I can only provide hints about patenting possibilities in what I have written below.

I am of course happy to provide the Committee with further details on a confidential basis.

3.1 Car bumpers

The graphene IP opportunity:

Obtaining a new patent for a combined **graphene-SALi** car bumper looks unrealistic, but we can still claim alternative IP rights.

However, I have good track record of inventing. So I am not completely ruling out the possibility of future patents relating to a **graphene-SALi** car bumper.

The market opportunity:

Technology developments since the collapse of the PedSALi project suggest that there could be a mass market demand for a combined **graphene-SALi** car bumper.

- (i) **Current technology developments: the lethal combination of pedestrian/driver texting and quiet battery powered cars**



Figure 3. Warning signs will not eliminate the problem of texting pedestrians walking into the road and being knocked down by vehicles.

The increasing number of vehicles that run on quiet battery power in built up areas also threatens to increase the number of pedestrian accidents. This is a particularly potent threat if the driver is also texting while driving.

JUNE 12, 2015

Green and Silent, But are Electric Cars Proving Dangerous for Pedestrians

by Rosenfeld Injury Lawyers

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Pedestrians can easily hear the sound of a large motorcycle or diesel chugging commercial truck when passing close by. However, the same cannot be said for hybrid and battery-powered vehicles that barely make a whisper when moving. The decades of designing electrical cars and hybrids in an effort to reduce inside and outside noise has resulted in nearly silent transportation with maximum comfort from minimal noise.

Many potential car buyers seek out electric vehicles because of their numerous features including minimal noise, low running costs, a quiet drivetrain and their ability to help the planet. Electric car owners have remarked that the absence

(ii) **Future technology developments: driverless cars.**

Potential legal problems relating to responsibility for pedestrians being injured by driverless cars will encourage the automobile industry to make its vehicles as pedestrian friendly as possible.

Driverless car review launched by UK government

By Jane Wakefield
Technology reporter
© 11 February 2015 | Technology



Figure 4. The UK is competing with other advanced economies in the race to develop driverless cars. But the combination of two British innovations, graphene and SALi, could give us the opportunity to develop a unique safety product for this market.

The following diagrams explain how a “smart” SALi filled car bumper works.

I obtained international patents to protect the design. But these had to be abandoned when I ran out of funds and the research fraud problems blocked progress.

The point to note is that incorporating graphene into the packaging material would certainly have improved the product quality. But this benefit would have been obvious to any skilled engineer, so obtaining a strong patent for a **graphene-SALi** car bumper would have been difficult.

The following diagrams show a plan view looking down on a cross section through a SALi filled bumper.

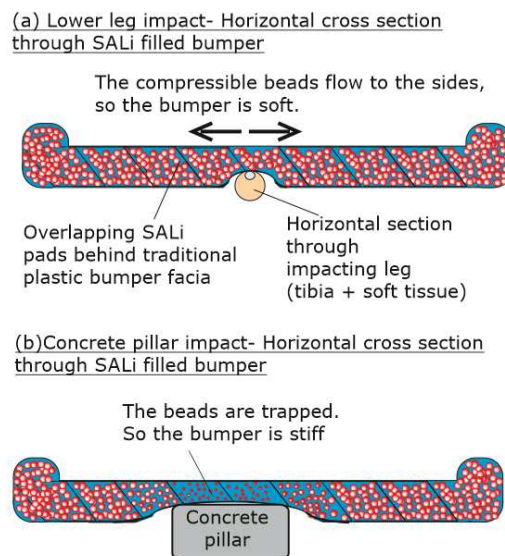


Figure 5. The incorporation of graphene to improve packaging strength would have reduced the total weight of the bumper. But, at the moment, it is difficult for me to identify a inventive step that is patentable.

Other IP protection opportunities

- (i) The specific recipe relating to the SALi fluid materials combined with the graphene packaging specifications would be eligible for copyright protection.
- (ii) Design rights could be claimed to protect a distinctive visual appearance for the bumper. [We need to design the bumper so that small children hit by the car are flipped up onto the bonnet, rather than under the wheels. This will probably result in a subtle change in conventional bumper shape.]
- (iii) We could create a distinctive product name and trademark it.

Submission from Bill Courtney T/A Cheshire Innovation
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Patents are the most powerful form of IP protection, but they are also the most difficult to obtain and expensive to maintain at an international level. So the weaker IP rights listed above have their merits.

3.2 Combined **graphene-SALi** motor vehicle suspension systems

There is some evidence that a disgruntled Manchester University employee has leaked my unpublished SALi car suspension designs to Nanjing University in China. I present the case at www.cheshire-innovation.com/sali/CrashSALi-Project.htm

After I complained to the Chinese University and also to the journal publisher, Elsevier, the Chinese stopped publishing papers.

I suspect the Chinese academics were more innocents led astray, than dedicated IP thieves.

Nevertheless, to protect my intellectual property after this incident, I filed a new patent application describing an improved SALi car suspension system. [Application number GB0915807.2]

I am hopeful that this will end up as a granted patent within the coming months.

The graphene IP opportunity:

My pending patent is broadly written and could be used to defend a SALi vehicle suspension system that includes graphene.

But there is also a realistic chance that we could obtain a new patent for a **graphene-SALi** car suspension unit.

This differs from the car bumper case because graphene brings at least two improvements to the suspension unit that can be exploited using a new design. .

Here are two diagrams from the patent application with notes in red font explaining how graphene could improve the design.

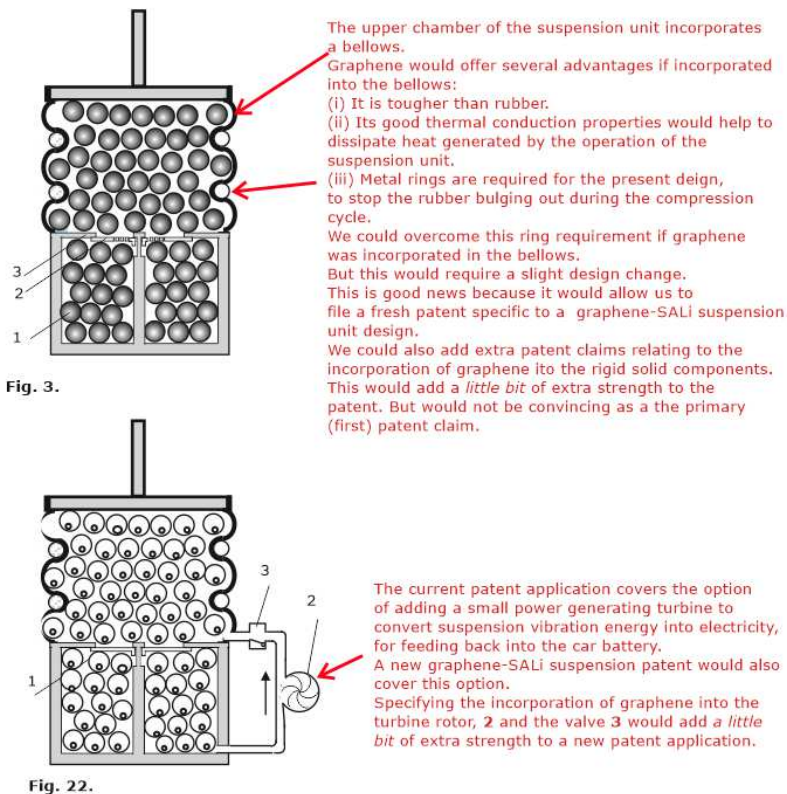


Figure 5. (Figures 3 and 22 in patent application GB0915807.2.)

Update 15 April 2016

Dr Huw Davies, an engineer at Cardiff University, has informed me that one of his PhD students who investigated my SALi based car suspension designs for his PhD research project has today submitted his thesis. This thesis provides us with a strong theoretical background for taking the SALi suspension design forward.

4 The logjam preventing the development of combined *graphene-SALi* products in collaboration with Manchester University

It should be clear to anyone visiting my website (www.cheshire-innovation.com) that I do not hold the vast majority of decent researchers at Manchester University responsible for the Manchester problems I have experienced in the past.

In fact the opposite is true. I am extremely worried that if I am successful in unmasking the Manchester research fraud, the reputations of the decent majority will suffer collateral damage.

As a professed 'Manchester Man', I am keen to collaborate with the University again. Hopefully, this will send out a message of confidence about my trust in the wider University.

But collaboration is only possible after the University has faced up to its ethical responsibilities in tackling the SALi research fraud.

Unfortunately, this is not going to be easy because over the passage of time, several senior staff at the University have been drawn into the cover-up of the SALi research fraud.

For example, if you visit this web page

http://www.cheshire-innovation.com/sali/CrashSALi-Project_files/British%20Reward.htm

you will discover how Professor Colin Bailey created false evidence to suggest that I do not own the SALi intellectual property rights.

Professor Bailey is a director of Graphene Lighting PLC, the company at the centre of the graphene IP controversy.

Bill Courtney