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Graphene based solutions for the world's biggest challenges

Annual General Meeting – 8 December 2015

Presented by
Mark Muzzin, CEO / Managing Director

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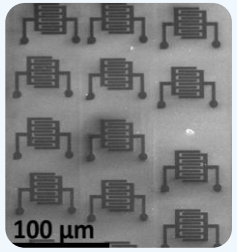
Our Focus

Graphene is the wonder material of the 21st century

The sky is the limit for applications but we are focused on three that will solve a number of the greatest challenges facing the world today:

- Energy storage for use in electric vehicles, renewable energy and consumer electronics
- Nano-filtration membranes for use in water filtration, industrial processes and food/beverage processing
- Customised graphene-coated sand for low cost water purification and decontamination – activated carbon replacement product



Super-capacitors for Electric Vehicles

Large-area membranes for water filtration

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Our Team

We will overcome technical and economic barriers to translate graphene research into high-value applications

Mark Muzzin – Founder and Managing Director/CEO of Ionic (expertise: business management)

A/Prof Mainak Majumder - Director of Ionic and Research team leader (expertise: nanomaterials, separation science)

Dr Anne-Marie Grisogono – Director of Ionic (expertise: Physicist with 20+ years in Defence (DSTO)

Dr. Parama Chakraborty-Banerjee - Postdoctoral research fellow (expertise: electrochemistry)

Dr. Dhanraj Shinde - Postdoctoral research fellow (expertise: chemistry)

Samuel Martin - PhD candidate; (expertise: nanofluidics)

Dr Rachel Tkacz – (expertise: colloidal phases of graphene)

Abozar Akbari - PhD candidate (expertise: fabrication of graphene-based membranes)

Dr. Akshat Tanksale – Senior Lecturer, (expertise: reaction engineering, graphite to graphene oxide scale- up)

A/Prof. Adrian Neild – (expertise: microfabrication, fluid mechanics)

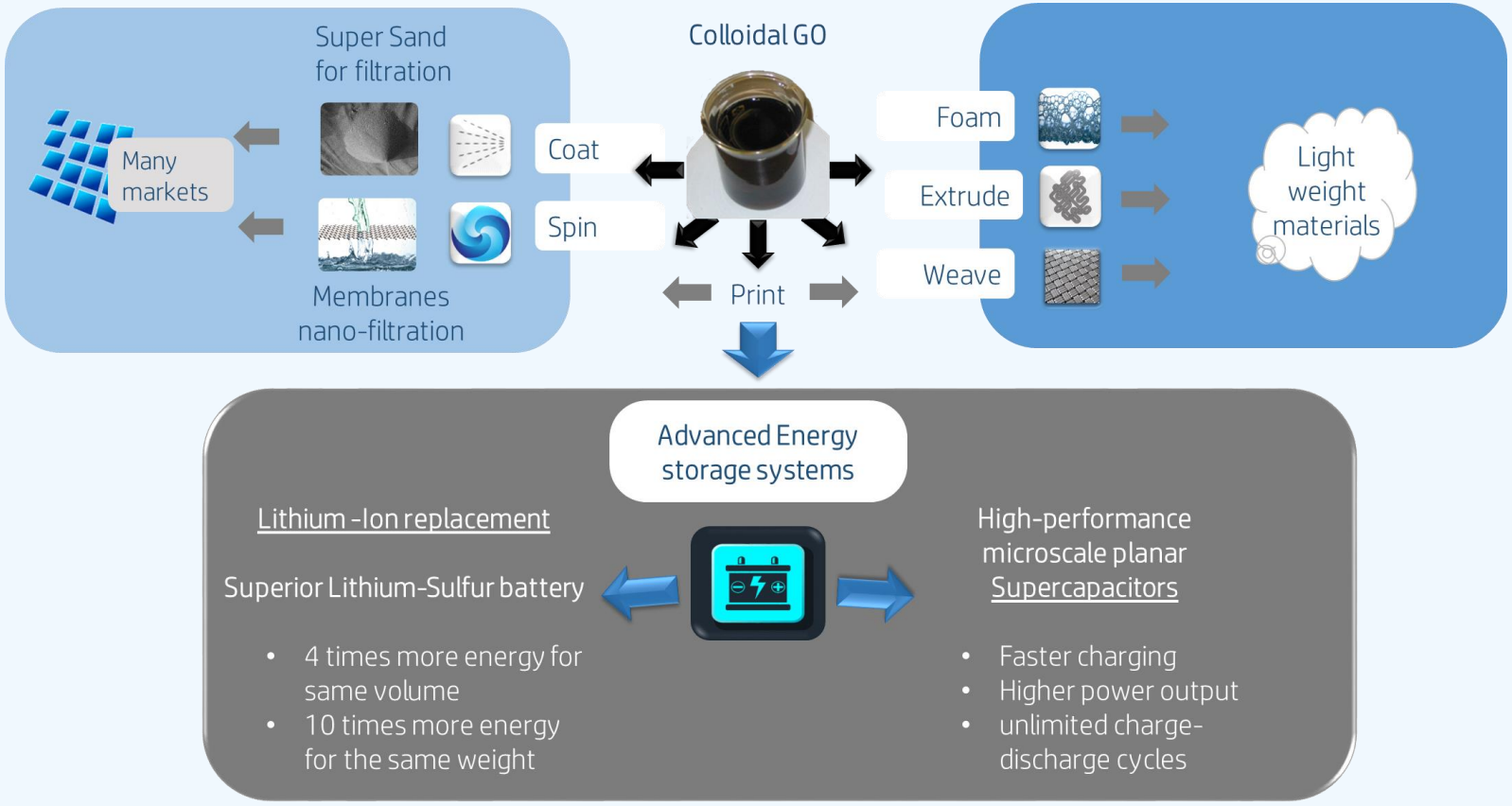
Phillip Sheath - PhD candidate (expertise: graphene based materials for water treatment)

Derrek E. Lobo - PhD candidate (expertise: micro-/nano-fabrication)

Mick Wade – Monash Business Development Manager

Critical Core Technology

The critical core technology we have is control of the Graphene Oxide (GO) production and the ability to fabricate it into many diverse forms for even more diverse applications. There is IP associated with the method of production, and we are on the cusp of generating further major advances in the speed, cost-effectiveness and environmental friendliness of the production method which will greatly strengthen our commercial advantage and will flow on to better, cheaper, faster production of all Ionic's applications.



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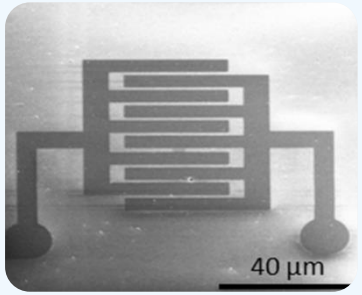
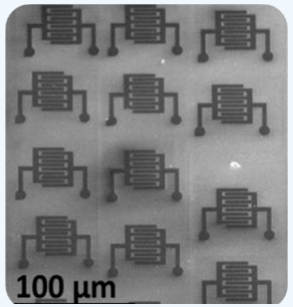
Energy Storage Technology

The best micro planar super-capacitor in the world – as measured by 4 parameters:



- ✓ Fastest response
- ✓ Best energy density
- ✓ Best power density
- ✓ Lowest loss



Parameters	Ionic's Technology	Best competitors	What this means
Response time (ms)	0.033	19	Rapid power surge and faster charging
Energy density (Wh/cm^3)	0.173	0.002	Sustain high power for longer time
Capacitance (mF/cm^2)	102	2.314	More energy in same volume
Equivalent series resistance ($m\Omega\ cm^2$)	0.35	3600	Less losses

Compared to chemical batteries such as Li ion, super-capacitor energy storage systems have several big advantages:

- Much faster charging – up to 100 times faster
- Much higher power output – so electric vehicle will be able to accelerate a lot faster when required
- Much longer usable lifetime– essentially unlimited charge-discharge cycles
- Can be rapidly recharged while driving, with regenerative power from braking, or from solar cells built into vehicle skin
- Much safer and environmentally friendly

An electric vehicle using a super-capacitor with these specifications will have a series of amazing performance characteristics

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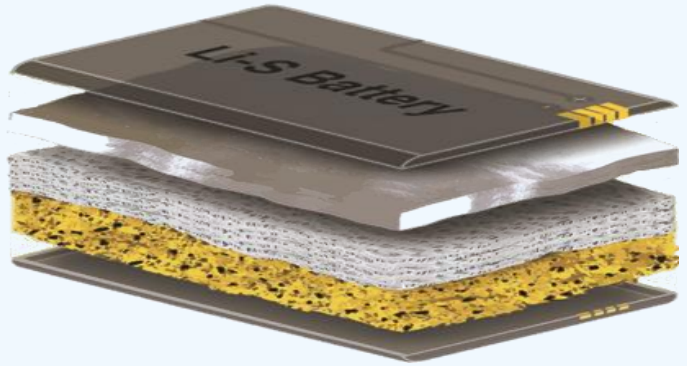
Lithium Sulphur Breakthrough

Elemental Sulfur is lightweight, inexpensive and abundant



Compared to the state-of-the-art Li-ion cell, Li-S has:

- 4 times more energy for same volume
- 10 times more energy for the same weight

However this amazing potential with Li-S has not been attainable in practice because performance degrades rapidly with each cycle

Our teams breakthrough in reducing battery degradation opens the road to practical exploitation

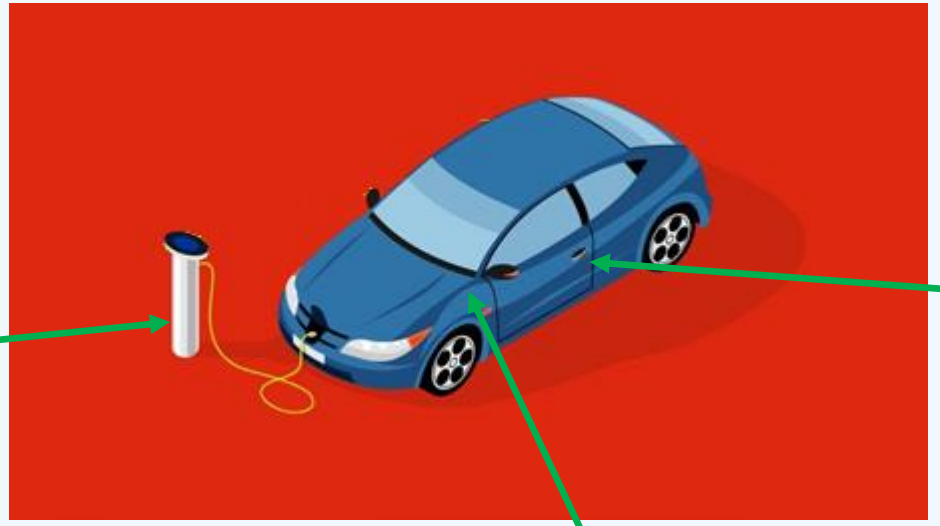
Most EV manufacturers use state of the art Li-ion battery packs, or they could use our Li-S technology and have far superior battery performance and at less production costs per battery

Our Energy Storage Solutions For EVs

Electric Vehicles need both **high energy capacity for improved range**, and **high power capacity for improved performance**

An advanced hybrid energy storage system can meet both requirements:

- Main energy storage system: exploiting Ionic's LiS battery technology to greatly increase the on-board energy capacity in a smaller lighter system than the state of the art Li ion systems
- High power system: exploiting Ionic's advanced super-capacitor technology to provide superfast charging and high power surging, with fast recharge of surge capability through regeneration, renewables, or topping up from LiS system.



Faster charging with Super-capacitors and unlimited charge-discharge cycles

Lithium-Sulfur battery breakthrough
Higher performing replacement for Li-Ion batteries

Ionic's unique Graphene Oxide technology can produce lightweight structural materials

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Nano-filtration Membranes

Membrane separation market

Global market for membrane separation technologies will grow to USD 25.7 billion annually by 2017. These are used in a variety of applications:

- Water Treatment (municipal, waste water and agriculture)
- Pharmaceutical manufacturing
- Chemical processing
- Environmental rehabilitation

Membrane modules

Water treatment makes up the vast majority of this market. As water shortages and environmental degradation continue to threaten billions of people around the world, the challenge will be to find more effective technologies to address these issues. We are developing graphene membrane technologies to improve the health and well-being of people world wide.

Our Graphene Nano-filtration Membranes have:

- High chemical resistance making them safer and lower maintenance
- 10 x higher flux than polymer membranes resulting in much greater efficiency
- High mechanical strength for reduced maintenance and lifetime cost
- Tuneable selectivity during manufacture for precise customisation

Large-area membranes we produce

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Super Sand

Super Sand is:

- A simple technology
- Close to commercialisation
- An alternative product to activated carbon
- A tailorable product for customers
- Competitive in cost, with higher performance
- A potential product capable of removing mercury from flue gas
- Easily retrofitted into existing water treatment infrastructure

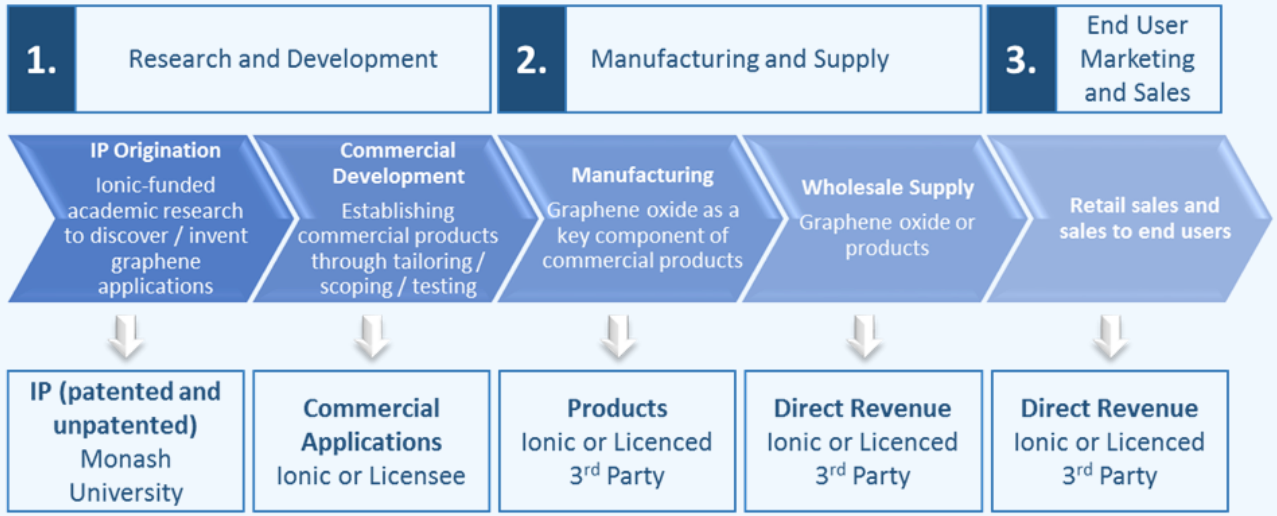
We are working to develop, test and refine our SuperSand for potential use in water treatment applications. We are specifically targeting a range of contaminants critical to many water utilities and environmental protection agencies around the world:

- Natural Organic Matter: Humic acid, Hydrophobic and Hydrophilic fractions
- Taste and Odour compounds: MIB (2-methylisoborneol)and geosmin
- Algal toxins: Saxitoxin(s), Cylindrospermopsin, Microcystin-LR, Anatoxin-a
- Metals: Manganese, iron, Arsenic

In addition to these programs, Ionic will also focus on other compounds such as pesticides and endocrine disrupting chemicals which have much greater significance in overseas markets.

Business Model

We will build our business based on an ability to flexibly manipulate the graphene value chain and control the revenue curve that is generated



Ionic can realise revenue at any point in the value chain as follows:

- Sale of the License to a third party (prior to commercialisation) for an upfront fee/royalty stream
- Develop a commercial application/product and then license a third party to manufacture/sell the product in exchange for upfront fee/royalty
- Develop a commercial application and manufacture via Ionic's own facilities and license a third party to wholesale/retail the products in exchange for upfront fee/royalty
- Develop, manufacture and wholesale products to a third party that will then sell to end users to generate direct sales revenue
- Be a vertically-integrated manufacturer and retailer of products to end users for direct revenue

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Path to Markets

We aim to be the first to market, and to stay ahead of the wave with constant innovation which we can do with our amazing R&D team

- Build graphene oxide pilot plant – 6 month build time – unlocks the revenue chain
- Develop super-capacitor working prototype for electric vehicle – early 2017
- Develop Li-S battery technology for EV and renewable energy markets
- Develop SuperSand products and target activated carbon users – revenues by mid/late 2016
- Nano filtration membranes – module development and relationships with two major U.S. companies in this space – revenues by mid/late 2016 from direct sales or potential licencing arrangements

Ionic has always been focused on commercialisation and mass production

Competitive Advantage

We can demonstrate a range of competitive advantages that will lead to our success:

- Advanced technology in super-capacitors and membranes
- SuperSand product that will generate revenue quickly
- World class research team based in a world class research institution
- Australia has very low political, economic and regulatory risk and close to Asia

Our premier advantage:

Graphene oxide production capacity that is unmatched and which will form the basis of all our capabilities – we control the production of the base material – huge cost advantage

Graphene oxide pilot plant

Graphene oxide – our wonder material

Current State of Play

We have hit a number of targets recently, including:

- Further advancements with graphene oxide production – speed and cost of production
- Engaged manufacturers in U.S. on nano-filtration membranes to support commercialisation of our graphene membrane technology
- Monash Team have published a cornerstone paper on micro planar super-capacitors and we are placed at number one as measured by four parameters and by huge margins
- We now have two ways to manufacture our super-capacitors
- Breakthrough with Lithium – Sulphur battery technology (key issue with technology solved)
- Established relationships with first potential customers on all our applications
- Begun testing mercury absorption characteristics of SuperSand from flue gas – New EPA rules in U.S.
- In discussions with a number of potential customers and groups interested in taking a corner stone position

Next steps:

- Planning to IPO by the end of the first quarter 2016
- Finalising seed capital raise to repay SER loan, commence pilot plant engineering work and fund the cost associated with the proposed ASX listing

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Thank You

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