Zentek sets its sights on treating skin conditions as it expands potential uses for its ZenGUARD graphene coating

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As the world becomes increasingly interconnected, we have seen how the risks of disease transmission have also increased. In response, companies like Zentek Ltd. (NASDAQ: ZTEK | TSXV: ZEN) are leveraging cutting-edge nanotechnology to develop new ways of protecting people from harmful pathogens. It is dedicated to researching and developing new technologies, specifically around nanomaterials. Their graphene-based solutions have the potential to revolutionize many industries beyond healthcare, including electronics, energy storage, water treatment, and more. They have partnered with leading companies in each of these sectors to commercialize their technology.

This need is why Zentek created an antimicrobial coating known as ZenGUARD™, a proprietary graphene-oxide silver compound shown to be highly effective at filtering out bacteria and viruses. The product has been measured to filter 98.9% more bacteria and 97.8% more viruses than standard surgical masks.

Recently, Zentek's team has been focused on commercializing the patent-pending ZenGUARD™ coating. InvestorIntel's Tracy Weslosky recently spoke with Zentek CEO and Director Greg Fenton about their current efforts and their recently announced success of its commercialization efforts.

Zentek announced that it has entered into a Reciprocal Supply Agreement on March 31, 2022, with EkoMed Global Inc., an

international manufacturer and distributor of personal protective equipment (PPE). In this agreement, Zentek will sell quantities of its coated material to be used initially for surgical masks made by EkoMed and eventually other PPE in the future. Zentek continues to work to expand its network of partnerships and is looking to get FDA approval for ZenGUARD-coated products.

In July Zentek filed a provisional patent on the use of ZenGUARD as an anti-inflammatory agent for dermatological conditions. Further expanding its potential as a dermatological product, it is currently being researched for treatment of various skin conditions, including both infectious and inflammatory conditions like acne, psoriasis, eczema, sunburn, poison ivy, warts, seborrheic dermatitis and toenail fungal infections.

Zentek is also positioned strategically from a supply chain perspective. The Albany Graphite project is located in Northern Ontario, Canada, and they own 100% of the project. The graphene from this source has a combination of graphite purity, particle size, and consistency which could make it ideal for certain solutions. This project could be a significant advantage as Zentek continues to develop graphene-based solutions for various industries.

As the ZenGUARD brand is based on graphene, controlling their own source of graphene can lead to cost and quality control advantages. Their team is also developing surgical masks, HVAC filters, personal protective equipment, rapid detection point of care diagnostics tests, and pharmaceutical products that are all based on graphene-based compounds.

Zentek could have large potential upside if it can capitalize on its technology. They are well positioned to continue growing their business through a combination of strong IP protection,

continued innovation, and strategic partnerships. The key will be whether Zentek can continue to expand the market for its ZenGUARD coated products and partner with enough manufacturers to win enough market share in Canada and abroad.

ZEN Graphene is changing the world one nanomaterial at a time

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Scientists have not unanimously settled on a precise definition of nanomaterials, but agree that they are partially characterized by their tiny size, measured in nanometers. A nanometer is one millionth of a millimeter – approximately 100,000 times smaller than the diameter of a human hair. For a while, nanomaterials were going to save the world by making everything faster, stronger and maybe even higher. But Olympic motto aside, there was a lot of hype about nanomaterials and a decade(s) later not much to show for all that optimism. Or maybe there is if you look in the right places.

Nano-sized particles exist in nature and can be created from a variety of products, such as carbon or minerals like silver, but nanomaterials by definition must have at least one dimension that is less than approximately 100 nanometers. One such company that is making progress in the world of nanomaterials is ZEN Graphene Solutions Ltd. (TSXV: ZEN), despite starting life as a mining company. In fact, the Company still maintains its unique Albany Graphite Project, which provides the company with a

potential long-term competitive advantage in the graphene market. The unique genesis of the Albany deposit, resulting in very fine-grained graphite crystallites, yields an ideal graphite precursor material for conversion to high-value graphene, graphene oxide and graphene quantum dots that can be used in a wide variety of applications.

However, don't kid yourself into thinking this is a mining story. It is very much a technology story that has evolved out of the special characteristics of the graphite available at the Albany deposit. ZEN has a broad reach as far as solutions being derived from nanomaterials. Front and center is the ZENGuard™ antimicrobial coating which can be utilized on PPE, filtration media (HVAC filters) and other materials such as paper, cardboard etc. as a preventative 'catch-and-kill' mechanism. The Company has developed a non-toxic, antimicrobial coating that is 99+% effective against numerous pathogens, including COVID-19, with initial testing showing a further 98% effectiveness after 108 days. ZENGuard™ on masks, gloves and other PPE to protect front-line workers, the public and reduce the spread of pathogens (including and beyond COVID-19) has an estimated global market of US$52 billion. While the potential market for ZENGuard™ on air filters to kill airborne pathogens in homes, schools, hospitals and commercial and industrial spaces is estimated at US$66 billion. Not a bad starting point.

As a spin-out from the focus on everything COVID-19, ZEN recently announced exclusive worldwide rights to commercialize rapid, saliva-based COVID-19 antigen testing technology in partnership with McMaster University. This technology is exceptionally accurate (similar to current PCR tests), saliva-based, affordable, scalable and provides results in under 10 minutes. It appears we aren't going to rid ourselves of this pesky virus anytime soon. So perhaps the best solution to getting on with some semblance of normal is accurate, rapid

testing.

Being an optimist and looking beyond COVID-19 and hopefully no other mutation or pathogens running amok in public, we find that ZEN has developed a stable diesel fuel additive, which increased the performance of diesel fuel by up to 10% in initial testing. Greg Fenton, ZEN CEO commented: “With global market estimates for diesel fuel alone near $1 trillion, the size of the challenge to reduce emissions from this level of demand is massive, but so is the opportunity for novel solutions to help us be more efficient in our usage.” Regardless of whether you want zero emissions tomorrow, as long as everyone continues to order stuff off Amazon and you want fresh fruit in your grocery store, diesel demand is going to be with us for a while. So rather than be an environmental zealot, why not embrace solutions that help reduce emissions in the interim until we can finally achieve our ultimate goal. Which is a good segue into research ZEN is doing into lower-cost, reduced weight, higher performance and capacity energy storage applications by developing graphene-wrapped silicon anodes for Li-ion batteries.

Then there’s the classic stereotype of nanomaterials making everything better. ZEN has its fingers in corrosion protective coating for reduced corrosion and enhanced longevity for steel. Polymers that enhance strength, longevity, and conductivity that can be used as versatile replacements for metallic electromagnetic shields. There’s also enhanced strength and electrical conductivity aluminum for the automotive industry and enhanced strength and longevity cement based composites for the construction industry. I’m probably missing something but you get the picture.

On a final note, on June 16th ZEN and Trebor Rx Corp. provided an update on the Health Canada review process for the ZENGuard™-

enhanced, ASTM level 3 surgical mask. Clearly, the sooner they can get approvals and get mask production underway, the sooner they can start to realize the revenue from the Trebor agreement signed in November 2020 or a minimum of 100 million masks/filters. As a prospective investor, this is the news I'm eagerly awaiting.

Scaling up graphene production to meet forecast demand, ZEN Graphene shares double since April

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In recent years we have heard that graphene can be the next super material due to its immense strength and electrical conduction properties. The next step is for large scale, low cost, graphene production to occur so as to supply the market demand. It looks like graphene's time has now come.

A 2019 Canaccord UK research report estimated worldwide graphene sales were likely to take off over the next few years reaching US$4.8 billion by 2030, growing at a CAGR of 45%. That is a huge forecast demand increase, effectively forecasting in the next 2 years graphene demand will double, then double again, and so on.

Graphene – Properties, Facts, and Applications

Source

One company is currently scaling up their graphene production from their new facility in Canada to meet what should be extremely strong demand this decade. That company is ZEN Graphene Solutions Ltd. (TSXV: ZEN) ("ZEN").

ZEN is an emerging graphene technology solutions company with a focus on the development of graphene-based nanomaterial products and applications. ZEN sources its graphite to make graphene from its 'unique' Albany Graphite Project. I say unique because independent labs in Japan, UK, Israel, USA and Canada have independently demonstrated that ZEN's Albany Pure™ Graphite is an ideal precursor material which easily converts (exfoliates) to graphene using a variety of methods.

Some of the numerous applications for ZEN's graphene include:

- **Aerospace and aircraft** – Graphene coatings that can greatly improve corrosion resistance, reduce friction and can be hydrophobic reducing ice formation. Graphene composites also help to increase strength and flexibility while potentially reducing overall weight.
- **Fuel Additive** – Graphene oxide in diesel/jet fuel improves fuel economy and reduces greenhouse emissions.
- **Electromagnetic shielding** and electrostatic dissipation.
- **Desalinization membranes** and low-energy dehumidification.
- **Heavy metal scavenging** –Graphene quantum dot/nanocellulose membranes are a recyclable material capable of removing industrial contamination.
- **Photovoltaics, displays**, **biomedical applications** using graphene quantum dots. Graphene based virucidal inks embedded in protective clothing to fight COVID-19 are another useful application right now.
- **Material enhancement** using graphene. Graphene is also

useful to boost tires strength and performance as well as a concrete additive to boost performance. Graphene can also be used to strengthen clothing for military applications. Graphene also strengthens aluminum, rubber, plastics and other materials.

- **Hydrogen storage and production** – Graphene is an ideal catalyst for water splitting (10x more efficient than platinum catalysts) and can store hydrogen in a solid state.
- **Advanced batteries** –Anode energy densities are 1500mAh/g in graphene-enhanced aerogels and 840mAh/g with reduced graphene oxide. Graphene has greater conductivity and improves cold weather performance. Samsung is developing an advanced graphene phone battery.

ZEN Graphene Solutions Guelph, Ontario facility is scaling up graphene production in 2020

The Guelph graphene facility opened in March 2020 and is now scaling up graphene production to sell to the many potential buyers as discussed above.

Source

In addition to ZEN's Guelph facility ramping up production, ZEN announced in July 2020 a new partnership with Evercloak and NGen for a 'Graphene in Cleantech Manufacturing Project'. The announcement states:

"The project entitled "Advancing Large-Scale Graphene and Thin-Film Membrane Manufacturing" will support the scale up of graphene oxide (GO) production by ZEN to supply GO to Evercloak for their scale up and optimizing activities."

For ZEN this is another significant endorsement and step forward along the pathway of commercializing their graphene. Evercloak is commercializing a manufacturing platform for producing continuous, large-area, monolayers of exfoliated 2D nanomaterials, including graphene, graphene oxide, molybdenum disulfide, and carbon nanotubes. These films are increasingly used for a wide range of applications such as energy storage, smart packaging, electronic devices, corrosion inhibitors, and membranes. Evercloak's initial focus is on manufacturing graphene-based membranes for dehumidification to significantly reduce the energy use and associated greenhouse gas related with building cooling.

ZEN's CEO Francis Dubé commented: "ZEN is pleased to support Canadian graphene-based innovations and Evercloak is a wonderful example of what can be achieved with nanomaterials and Canadian entrepreneurship. NGen supports the accelerated development of high potential technologies such as our graphene collaboration. We look forward to helping Evercloak bring breakthrough technology to everyday life."

Closing remarks

Success in the manufacturing sector is about collaboration with your supply chain. ZEN continues to win interest in their graphene products and continues to develop a supply chain, on this latest occasion with Evercloak.

A recent C$2 million capital raise means ZEN has cash to accelerate their near term expansion activities, which will include funds for the Albany Graphite Project, further graphene research, graphene production scale up, COVID-19 initiatives, and other graphene applications development. Also the recent engagement of Hybrid Financial to help market ZEN should boost the number of eyes on the stock.

Combine the above with continuing commercial success selling graphene products and 2020 should see a successful year for ZEN. Late 2020 and 2021 should start to see revenues coming in and a lot more interest in both graphene and ZEN Graphene Solutions. Despite the stock price more than doubling since April 2020, the stock still looks reasonably priced trading on a market cap of C$57 million.

A graphene based virucidal ink face mask and line of clothing that does more than protect – it intends to kill COVID-19

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The face mask sector is hot right now. Even China can't make enough face masks to meet their own demand. As countries begin to ease the COVID-19 (coronavirus) lockdowns literally billions of people will require face masks. Many airlines are already making face masks mandatory, and this could soon spread to other forms of mass transport.

Even better than standard face masks are new high tech face masks designed to kill the virus, using antiviral nano-particles embedded inside the protective material.

Two companies are combining their expertise to produce new high tech face masks and other protective clothing that they hope

will kill the virus. They are ZEN Graphene Solutions Ltd. (TSXV: ZEN) and Graphene Composites Ltd. (GC). They have teamed up to develop a COVID-19 virucidal graphene-based composite ink for face masks and other protective clothing.

An agent that kills viruses, a virucidal ink that can be embedded into all types of personal protective equipment (PPE) could have immense benefits for the world right now. Imagine owning a mask that not only blocks the virus but can kill it. The medical world will love it, as it will give them the much needed protection they deserve, as they battle on the front lines of this severe pandemic that has now infected over 3.7 million people, killing ~258,360.

The plan

ZEN has synthesized a 'silver nanoparticles functionalized graphene oxide ink' that has been documented by previous researchers to kill earlier versions of coronavirus. Silver is well known to be a potential virucidal agent. Testing will be conducted at Western University's ImPaKT Facility Biosafety Level 3 lab in Ontario, Canada.

Once testing is completed (and assuming successful), the virucidal graphene ink would then be incorporated into fabrics to be included into masks and filters designed by GC.

The CEO of ZEN, Francis Dubé, stated:

> *"We are pleased to be collaborating with GC and be on the forefront of a new innovative technology that could contribute to combating the deadly COVID-19 virus. The development of this potential COVID-19 virucidal graphene ink is coming at a crucial time to provide effective PPE supplies for the safety of frontline workers and hospital staff."*

The CEO of GC, Sandy Chen, stated:

> *"Combining the deep nanomaterials expertise of GC and ZEN with a truly collaborative approach has enabled us to do a year's worth of R&D in a matter of weeks. Quickly developing and deploying our virucidal/germicidal ink would make a significant difference in slowing the rate of infection – thus saving many lives."*

Competitors

Given the newness of the COVID-19 pandemic there is so far little competition when it comes to virucidal protective clothing using graphene. One Israeli company is reportedly using a virucidal embedded into masks that consists of zinc oxide and copper oxide nano-particles.

ZEN's graphene has a huge range of potential uses

ZEN is already making great progress in the production of graphene with a huge range of potential uses such as: Tyre strengthener, aluminum/rubber/plastics enhancer, a cement additive/enhancer, diesel and jet fuel additive, graphene batteries, graphene based clothing and so on.

ZEN has unique graphite from which they make graphene

ZEN Graphene Solutions also have their own unique source of graphite at their Albany Graphite Project, which is highly suitable for graphene production. The unique Albany Graphite Project provides the Company with a potential competitive advantage in the graphene market as independent labs in Japan, UK, Israel, USA and Canada have demonstrated that ZEN's Albany PureTM Graphite is an ideal precursor material which easily converts to graphene, using a variety of mechanical, chemical and electrochemical methods.

ZEN's new graphene research and development facility at Guelph, Ontario, Canada

ZEN has recently opened their new graphene research and small scale production facility in Canada, with a goal of scaling up graphene production to meet consumer demand. Graphene product sales were launched in early March 2020. The research and engineering team will also be developing and testing custom functionalized graphene formulations as requested by industrial collaborators for product performance enhancement.

Source

Closing remarks

ZEN is one of the most innovate companies out there, with a focus on using graphene to disrupt and improve various industries. Their latest collaboration with Graphene Composites Ltd. is most exciting, as virucidal protective clothing can be a game changer right now in the fight against COVID-19.

Furthermore ZEN already has their own high quality Albany graphite source, and has started scaling up graphene production at their facility in Ontario Canada. This makes them a vertically integrated growing graphene producer, all for a market cap of just C$32 million.

Dr Dube on the competitive advantage of ZEN Graphene's Guelph Facility for Graphene Materials Production and Development

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"We can get graphite to 99.8% purity. Now, we need to take that very high-end graphite and turn it into graphene. We are working with some of the best teams in Canada, a bunch of different universities to do those things. The first agreement that we signed was with a university in Canada. That agreement is to do graphene production. This process uses heat, pressure and grinding to break the graphite into smaller bits and pieces. Basically, bringing it down to five to ten layers graphene. We can do kilograms of this material already. The process is patented and developed. We are going to keep trying to improve on it but it is already a very well established patent. The next one is with Prof. Chen at the University of Guelph. They are working on two different processes. A chemical process and an electrochemical exfoliation process where we are trying to make graphene oxide. This product is high end. We are getting down to one to three layers product. It is functionalized with oxygen groups in there. This will have very high value in the marketplace. The third one is with UBC Okanagan. We are doing a lot of research with them. We are doing graphene oxide. We are also doing graphene quantum dots which is really the very high-end stuff. This sells for four thousand dollars a gram on the marketplace. They are also doing things with batteries, with aluminum, with coatings…" States Dr. Francis Dube, Chairman,

CEO, and Director of ZEN Graphene Solutions Ltd. (TSXV: ZEN), in an interview with InvestorIntel's Tracy Weslosky.

Dr. Dube went on to provide an update on the grand opening of the Guelph Facility for graphene materials production and development. He said that the company is currently sourcing and purchasing the necessary equipment to build a small-scale pilot plant to produce products like Graphene, Graphene Oxides and Graphene Quantum Dots. Dr. Dube also said that the Graphene Quantum Dots market is expected to be a $30 billion market by 2030. He said that ZEN Graphene is in a unique position to dominate the market because it has a high-grade source material and a great team of scientists.

To access the complete interview, click here

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ZEN Graphene Solutions' Dubé on how graphene will be 'the real industrial revolution'

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"We have a unique source of graphite in Ontario that is like no other on earth. It is a very large resource. We will have decades of production from it. The other side what is really exciting is, we have got 10 different universities in Canada researching in applications for our graphene. What we are able to do with graphene is exploding. We have got the complete

vertical integration from the ground to the final integration product into consumer use." States Francis Dubé, Co-CEO of ZEN Graphene Solutions Ltd. (TSXV: ZEN), in an interview with InvestorIntel Corp. CEO Tracy Weslosky during PDAC 2019.

Tracy Weslosky: We are here at PDAC and I was just mentioning you were a shareholder. You liked the company so much you stepped in as co-CEO. Is that correct?

Francis Dubé: It is correct. Again, I have always loved the asset. Been involved for over 5 years and I just really got involved last year. Cannot wait to get this company launched again and we are doing fantastic things. PDAC is really well timed for us to do it this year.

Tracy Weslosky: Of course you have got the electric car, the battery materials with graphite, but you also have graphene.

Francis Dubé: Graphene is actually where our entire focus is on because of the applications that are coming to us. Every week right now there is a new application for graphene so the market is in front of us. It is a new revolution and we are at the right time and the right place right now. We cannot be more excited about where we are at….it is like the new plastic, the new steel. It was discovered in 2004. The guys got Noble Prizes for it for physics in 2010 and since then it has just taken off. Ford is using it now. We are starting to see a real industrial revolution based on this material. The sky is the limit with what this thing can do really.

Tracy Weslosky: Why ZEN Graphene? What is the competitive advantage?

Francis Dubé: There are two things. We have a unique source of graphite in Ontario that is like no other on earth. It is a very large resource. We will have decades of production from it. The

other side what is really exciting is we have got 10 different universities in Canada researching in applications for our graphene. What we are able to do with graphene is exploding. We have got the complete vertical integration from the ground to the final integration product into consumer use. We are very excited about that. It is a great opportunity for us….to access the complete interview, click here

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