

# Revolutionary Aptamer-Based Pathogen Technology from Zentek Unveils Rapid and Inexpensive Pathogen Detection Capabilities

written by InvestorNews | August 3, 2023

A Canadian company and their laboratory partner have developed a low cost simple and much faster way to better detect pathogens causing infections in our bodies. In recent weeks the team found a way to dramatically improve the effectiveness of this technology, which is really a medical breakthrough you won't likely see on the news, at least not just yet. Their technology uses 'aptamer' based diagnostics from a simple saliva test.

## What is an aptamer?

Aptamers are short sequences of artificial DNA, RNA, XNA, or peptide that bind a specific target molecule or family of target molecules. In the case of today's company, they are using single-stranded DNA molecules capable of binding specifically with target proteins on the surface of pathogens such as SARS-CoV-2 to detect if a person has COVID-19 or potentially other pathogens.

## Zentek Ltd.

[Zentek Ltd.](#) (NASDAQ: ZTEK | TSXV: ZEN) ("Zentek") is a certified graphene technology company focused on the research, development and commercialization of graphene-based novel products,

typically using nanotechnology.

Zentek's aptamer-enabled [Pathogen Detection Technology](#) is a low-cost, rapid, saliva testing, scalable technology initially to be used for COVID-19 testing, but can be adapted to detect other pathogens. Zentek has [exclusive worldwide rights to commercialize](#) their COVID-19 antigen testing aptamer-enabled technology. The technology is being developed by Zentek and their technology partners at McMaster University Li Lab, led by Dr. Yingfu Li.

Zentek's collaboration with McMaster University extends beyond its exclusive license and now encompasses all aptamer and DNAzyme uses, including diagnostics, therapeutics, and neutralization agents, not limited solely to SARS-CoV-2 applications.

## **Aptamer technology breakthrough, up to 250 times increase**

Zentek recently announced a breakthrough in the team's aptamer-enabled technology, [stating](#):

*"Dr. Yingfu Li and his team at the Li Lab have developed a novel aptamer technology that increases the binding affinity of aptamers by up to 250 times. The increased binding affinity enhances the limits of detection for aptamer-based diagnostics. In addition, the enhanced binding affinity may lead to the successful adaptation of these same aptamers for new therapeutic and prophylactic treatments. Binding affinity is a key metric in both diagnostic and therapeutic applications."*

Understandably most people will not understand the implications of what is going on here, so I will spell it out. Effective

Aptamer-based pathogen technology opens up a whole new potential to 'rapidly and cheaply' detect pathogens. In time this can be expanded to potentially detect other markers of disease in the body. Furthermore, it has the potential to more effectively treat diseases. But that's the next chapter, best discussed another time and assuming Zentek continues down that pathway.

Dr. Yingfu Li recently [stated](#):

*"The novel aptamer technology platform developed in my lab at McMaster University is demonstrating a robust increase in binding affinity to every aptamer we have tried so far. Combining this technology with aptamers that have high specificity **has created a very exciting potential for new therapeutics and diagnostics**. The enhanced binding affinity from these new aptamers has led to **consistent and successful in vitro testing** in my lab and the lab of Dr. Leyla Soleymani for diagnostic applications, and more recently, with in vivo testing in the lab of Dr. Matthew Miller for therapeutic applications. These early results are very exciting, and we look forward to future work that applies the technology to other potential therapeutic and diagnostic targets."*

*Note: Bold emphasis by the author.*

**The advantages of Zentek's aptamer technology for detecting Covid-19 or potentially other pathogens**



**The advantages of Zentek's aptamer technology are:**

- **Simplicity & Comfort** – uses saliva rather than a nasal swab reducing aversion to testing and risk of error in the sampling process
- **Accuracy** – electrochemical sensing technology rather than lateral flow allows for sensitivity equivalent to a 36 count RT PCR
- **Mobility** – simple hardware lends itself to easy transport and high throughput, point-of-care testing
- **Speed** – results in under 10 minutes
- **Low Cost** – aptamers can be developed more quickly and cost effectively compared to antibodies allowing us to be highly competitive compared to currently available rapid detection tests now and into the future
- **Scalability** – new aptamers can be developed to detect numerous other pathogens giving our technology the ability to enhance safety and empower businesses, governments and our healthcare providers well beyond COVID

Source: [Zentek website](#)

The potential for aptamer-based disease detection is truly remarkable. There is also potential one day that aptamers can be used to much more precisely target disease treatment or prevention in the body.

Greg Fenton, CEO of Zentek [commented](#):

*“Initially, we were working to develop aptamers for diagnostic purposes.....Dr Li’s initial breakthrough was important for diagnostic purposes, and now early testing points to the potential to create new therapeutics and prophylactics. I can’t emphasize enough how unexpected these results were to our team and how significant this development is if it is confirmed through future testing.”*

For more details, investors can watch the recent Zentek CEO interview [here](#).

Zentek is now at the stage of commercializing their aptamer-enabled technology [stating](#) that they are “commercial prototyping

readiness, and working with [Halteres Associates](#), a world-leading bioscience consultancy, to assist us in our commercialization process.”

## Zentek’s product pipeline

### Graphene Pipeline: What We’re Working On

**zentek**



**We know graphene: a key building block for a healthier and more sustainable future**

Source: [Zentek company presentation](#)

## Closing remarks

There is no more exciting company than Zentek. Apart from their aptamer technology Zentek has many other applications for their graphene nanotechnology including: [ZENGuard™](#) (a graphene coating applied to PPE to prevent Covid and other infections; also used for air filtration (HVAC) systems), [icephobics](#) (to prevent ice build up on planes etc), [ZENArmor](#) (corrosion resistance), [fuel additives](#) (helping reduce carbon emissions), [Graphene-wrapped silicon anodes](#), [conductive inks](#), [intumescent coatings](#), and [anti-inflammatory therapies](#).

Furthermore, Zentek makes their own graphene oxide at their Guelph facility and owns the Albany Graphite Deposit ([planned to be spun out](#)).

Zentek Ltd. trades on a market cap of [C\\$216 million](#). With commercialization of ZENGuard™ underway and Zentek's aptamer technology potentially to follow soon, Zentek is at a great stage to rapidly grow from here. Stay tuned in 2023 to see how Zentek performs and if they can successfully start to monetize their technology.

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# **Will Sixth Wave's fast and accurate breathalyzer revolutionize global pathogenic virus testing?**

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I'm hopeful that we will soon see this whole COVID issue become an endemic as opposed to a pandemic, and life as we know it, can return to something a lot more like it was before this annoying virus became the bane of our existence. Whether continued mutation of the virus allows us to get on with life or not, we need to be better prepared for the future, so we can get a handle on things sooner and keep the economy rolling, keep the kids in school and get rid of this whole division of society over masking and vaccinations. I've suggested in [past articles](#) that, in my opinion, effective, reliable rapid testing could go a long way to resolving this, and any potential future viruses

that come along. However, after getting my hands on the current generation of rapid tests and using them a few times to visit family and friends over the Holiday Season, I find it necessary to add one more descriptor – convenient. I actually stopped going out because the thought of jamming that swab up my nose again brings tears to my eyes and a bit of a queasy feeling.

But what if I told you there is a company out there that is on its way to developing a rapid breathalyzer test that can identify COVID and potentially many other viruses. I know it has certainly caught my attention. [Sixth Wave Innovations Inc.](#) (CSE: SIXW | OTCQB: SIXWF) utilizes unique applications of nanotechnology called Molecularly Imprinted Polymers (MIPs) for imprinting, capturing, and releasing substances at the molecular level. The technology has applications in multiple areas with a current focus on the recovery of gold, explosives detection, metabolite extraction and medical diagnostics for viruses. Sixth Wave can design, develop and commercialize MIP solutions across a broad spectrum of industries. The company is focused on nanotechnology architectures that are highly relevant for the detection and separation of viruses, biogenic amines, and other pathogens, for which the Company has products at various stages of development.

I'll try to briefly explain how this works without getting into too many hard-core science details given it's mostly over my head. Viruses have unique chemical profiles that result in different shape, size, and surface chemistry characteristics. Sixth Wave designs polymerizable ligands specifically to take advantage of the size, shape and surface chemistry of a target virus or target class of virus to achieve selectivity and sensitivity in diagnostic applications.



Source: Sixth Wave Innovations Inc. [Corporate Presentation](#)

They say a picture is worth a thousand words, but I suspect the diagram above would be a lot more than that if I could properly explain it. My simple analogy is that you build a puzzle with one specific piece missing and the only puzzle piece that will fit in that spot is the COVID-19 virus (or whatever virus or family of viruses you selected to fit your polymer puzzle). If you have the correct piece of the puzzle, it will indicate a positive result. If that doesn't make sense to you then you can go to the Company's [website](#) and do some more digging on your own because that's the best I've got.

Beyond the science, here is where Sixth Wave currently stands in its mission to stem the tide of emerging outbreaks quickly in order to prevent worldwide pandemics in the future. On December 14<sup>th</sup> the Company [announced](#) it had successfully demonstrated selective binding and detection of live SARS-CoV-2 virus in saliva samples using its patent-pending Accelerated Molecularly Imprinted Polymer (AMIPs™) technology. The next and final stage of laboratory-based development is to expand testing to a standardized panel of respiratory viruses to confirm that there is no cross-reactivity (or false positives as near as I can tell). Completion of the cross-reactivity testing is the last scientific development step required to produce specificity data before the Company can begin the process of applying for regulatory approval from government agencies such as the U.S.'s FDA and Health Canada.

Sixth Wave's technology overcomes problems that impact current methods to test for COVID-19 that require using biological materials (antibodies) to detect the virus. PCR, Polymerase Chain Reaction, tests are expensive, generally require unpleasant nasal swabs, and rely on laboratory analysis to return results, and as we've seen of late this has completely overwhelmed the system resulting in several days to get results.

Rapid antigen tests are faster but significantly less accurate, are also somewhat unpleasant (at least to me) and diminish in effectiveness as the virus mutates. Compare that to a handheld breathalyzer that could be used multiple times by the same user for easier, less expensive, less wasteful testing. Sixth Wave envisions its unit would have a disposable biosensor (cartridge) that is simply replaced upon a positive detection or after a predetermined sampling time if there is no positive detection.

Personally, I really hope that Sixth Wave can get this technology to the finish line as I think it would be a great benefit to society as a whole. Then there's the potential impact on the share price if they are the ones to come up with the de facto, go-to gadget for simple, convenient and inexpensive virus testing. With a current market cap of C\$27 million and trading almost at its all-time low share price, this could be quite the game-changer for Sixth Wave Innovations.