

# zeotech

**AN EMERGING MINERAL PROCESSING TECHNOLOGY COMPANY**

ASX: ZEO

[www.zeotech.com.au](http://www.zeotech.com.au)

September 2021

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# Company overview



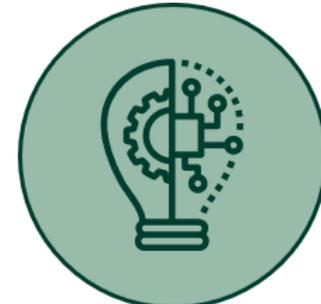
## **Strong growth prospects:**

An emerging mineral processing technology company



## **Proprietary process:**

Maximising green and sustainable practices: low energy, reduced production time, high reagent recycling, and non-toxic residue



## **Patent-pending technology:**

Delivers compelling competitive advantage low OpEx / CapEx, and high product margins



## **Exposure to diversified markets:**

Developing advanced materials, focusing on environmental solutions and sustainable food production



## **Global applicability:**

Production of low-cost high-grade absorbents with unique properties for a wide range of industry sectors



## **Near term cashflow potential:**

Approved Mining Lease exceptionally high-grade raw ore kaolin offering immediate DSO revenue opportunity

# Large market opportunities from core IP platform



## Sustainable low-cost production synthetic zeolites

- *Proprietary mineral processing technology originally developed for mine/process tailings remediation*
- *Low energy and production time*
- *Established \$2.4bn global market*



## Lithium refinery cleantech

- *Commercial downstream lithium residue tailings management solution*
- *Proprietary IP to convert Li process residue into high value molecular sieve zeolites*



## Mycotoxin animal feed additives

- *Climate change increasing moulds that create mycotoxins*
- *Mycotoxins impacting global protein production*
- *Industry collaboration*
- *\$1bn+ global market*



## CO<sub>2</sub> capture / utilisation

- *Objective is to improve efficiencies of proven CO<sub>2</sub> separation / capture processes*
- *Explore utilising zeolites as catalysts for CO<sub>2</sub> conversion*



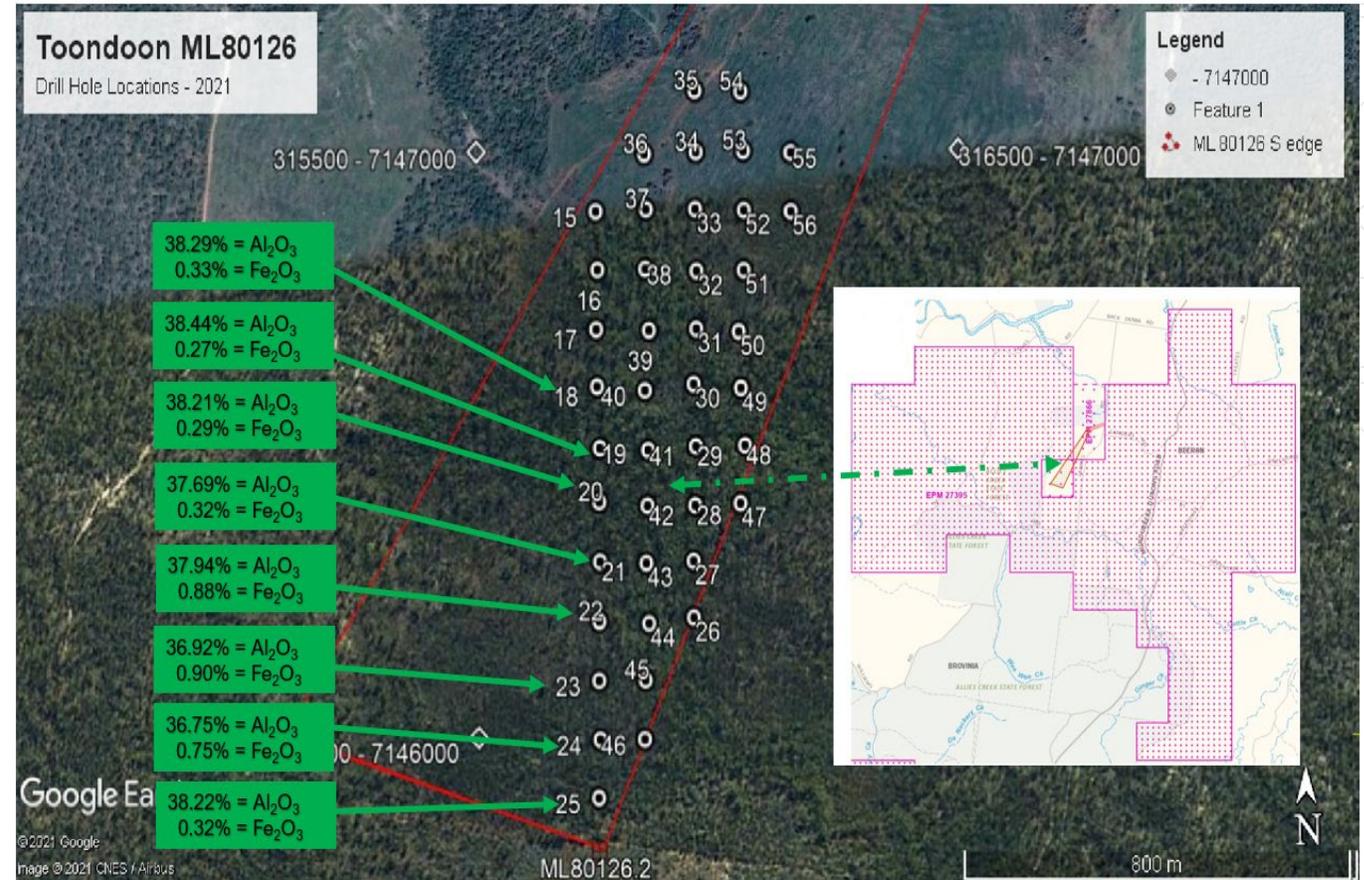
## Agronomic applications

- *Fertiliser delivery platform*
- *Decrease soil acidification*
- *Moisture retention*
- *Pesticide destruction*
- *CO<sub>2</sub> sequestration, offering carbon market opportunity*

common zeolite technology used across each vertical representing material market opportunities

# Approved ML accelerates time to revenue

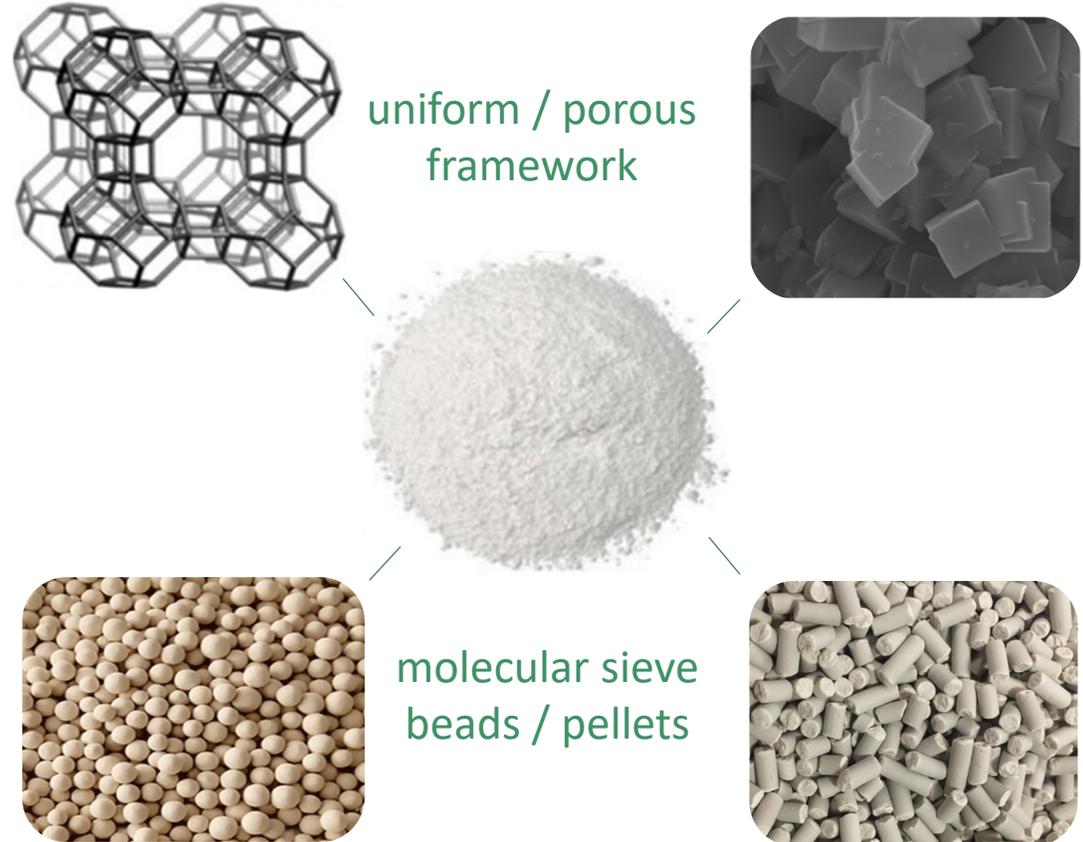
- Toondoon Project approved Mining Lease ML 80126 + EPM's 27395/27866 over 280 km<sup>2</sup>
- Exceptionally high-grade raw ore kaolin high alumina, low iron and scale brightness
- Synthetic zeolite OpEx materially improved UQ has produced high purity molecular sieve grade zeolite from Toondoon raw ore kaolin
- Immediate DSO opportunity - samples are in mainland China, demand for high-grade DSO kaolin evident
- Advantageous logistics - highway access to major ports
- One of highest-grade raw ore kaolin resources held under approved Mining Lease in Australia
- Elutriated ISO Brightness results 82.5 to 84.5  
*"This is among the best, unbleached, kaolin's reported in Australia."*



# Synthetic zeolite overview

Zeolites are high-value adsorbents / catalysts with broad applicability

- Synthetic zeolites are manufactured aluminosilicate minerals with a sponge-like structure (frameworks)
- Zeolites are made up of tiny pores that make them useful as adsorbents, catalysts and ultrafine filters.
- Type A zeolites are commonly known as molecular sieves
- Can be designed to selectively adsorb molecules or ions dependent on their unique construction and can be regenerated repeatedly for re-use



# Global applications

Zeolites act like a magnet that can hold cations, including heavy metals, ammonia, low level radioactive elements, toxins, petrochemicals, many different types of gases and a multitude of various solutions

## Diverse commercial applications:

- Energy and Refineries
- Fertilizer Industries
- Water treatment
- Oxygen Concentrator / Air Separation Units
- Paint Processing
- Insulating Glass Industries
- Polyurethane Process
- Animal Feed Additives
- Detergent Industry



Cryogenic Air Separation



PVC Heat Stabiliser



Water Treatment



Animal Feed Supplements



Insulating Glass Units



CO<sub>2</sub> Capture



Oil & Gas Industry



Detergent Builder



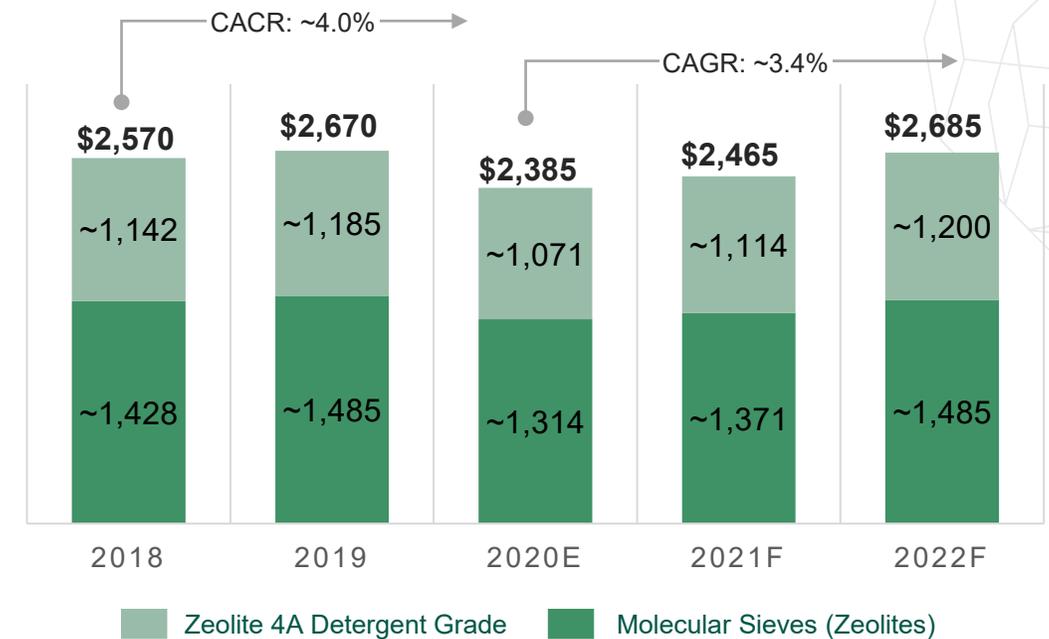
Paint Processing Industry

# ZEO technology unlocks mature / growing global market

- Type A mature established market >A\$2.6Bn
- Detergent grade zeolite manufactured for 30+ years
  - 4A detergent grade = A\$600-700/t
  - 4A PVC heat stabiliser grade = A\$725-785/t
- Targeting higher value Type A Molecular Sieves
  - 3A , 4A and 5A molecular sieve grade
  - A\$2,850-4,000/t
- Type X and Lithium X – program commencing 4<sup>th</sup> Quarter
- 13X molecular sieve grade and Li-X
  - A\$3,000-4,500/t (13X)
  - up to A\$15,000/t (Li-X)



Global **Type A** synthetic zeolites market, by grade (A\$ million)

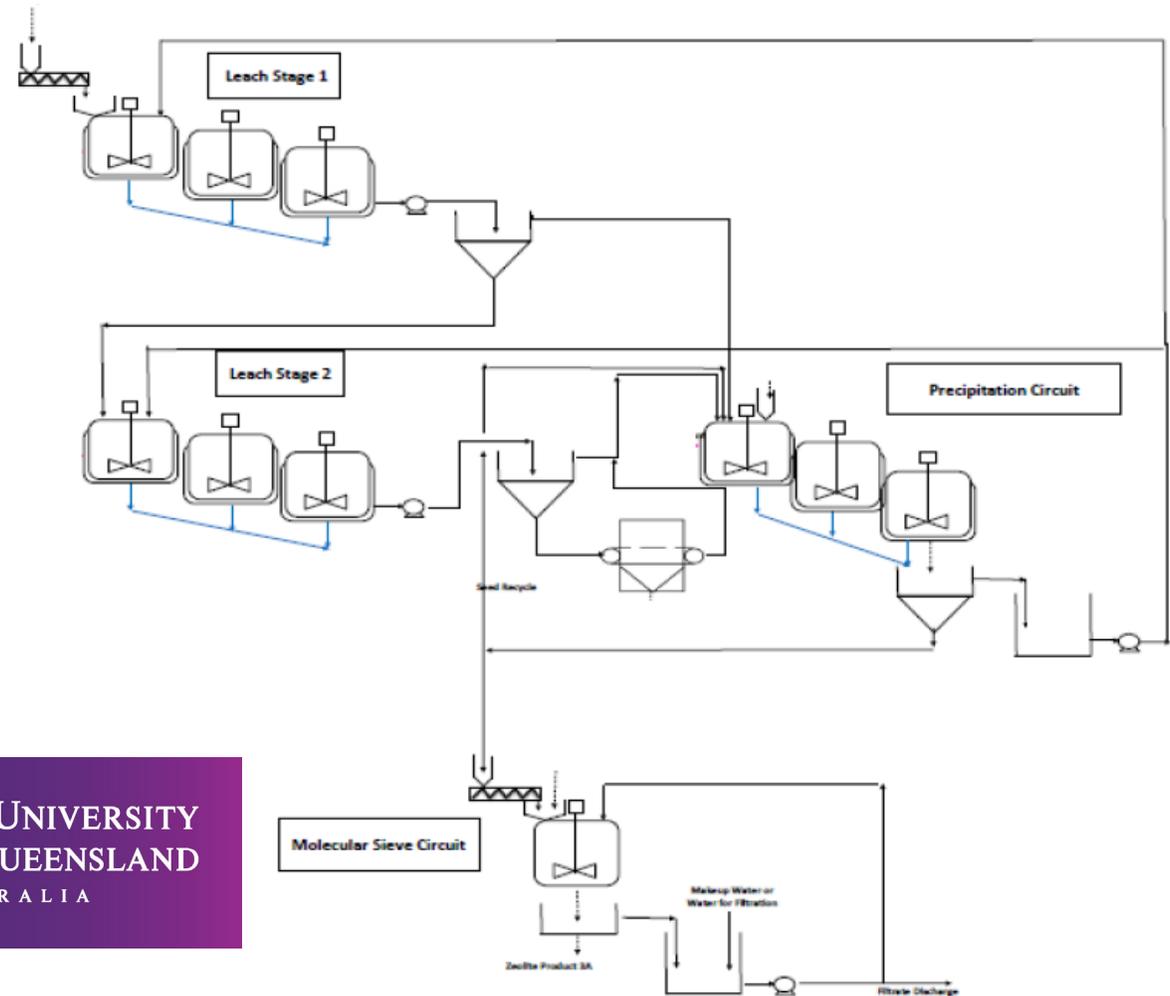


AUD = USD 70c (FX)

Aranca – Global Analysis 4A Detergent and 3A, 4A and 5A molecular sieves grade Nov 2020 (market data)

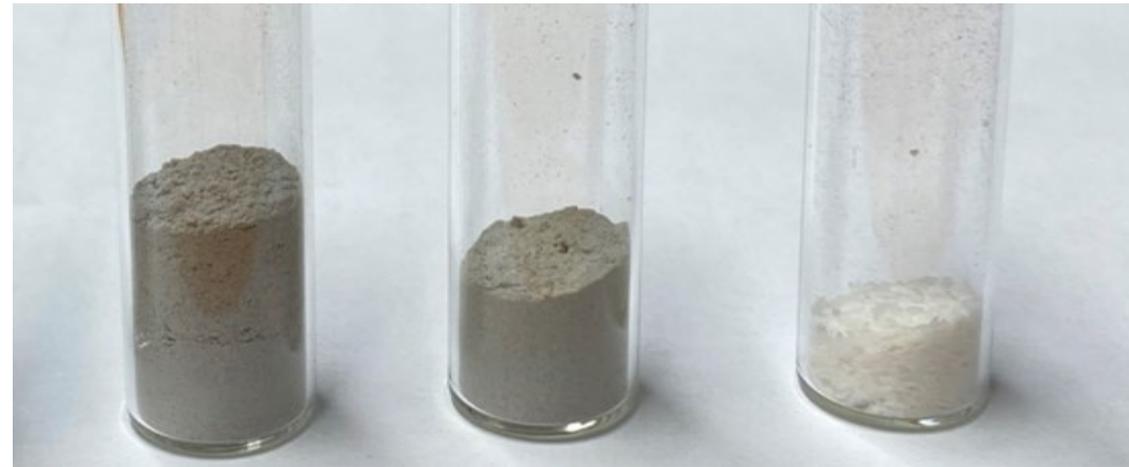
# Sustainable, proprietary low-cost manufacturing

- Distinct environmental advantages over conventional production methods
- The UQ Chemical Engineering team has demonstrated (under lab-scale conditions):
  - Up to 70% reduction in energy consumption
    - thermal activation stage
  - Up to 80% reduction in production time
    - subsequent zeolite precipitation steps
- Low environmental footprint:
  - high reagent recycling
  - significant reduction in by-product residue
  - non-toxic process residue
- Primary commercial plant P&E remains 'conventional' = low CapEx
- Dual-feed pilot program progressing, continuous (bench) circuit underway



# Lithium refinery cleantech

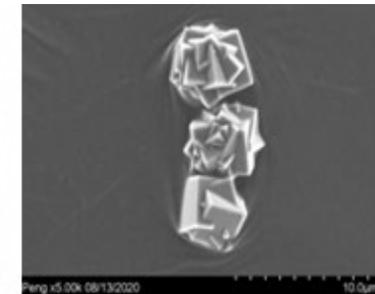
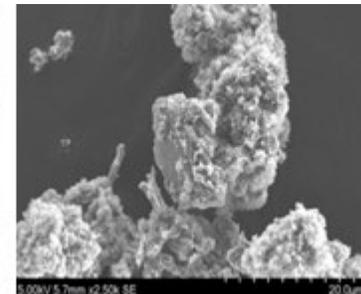
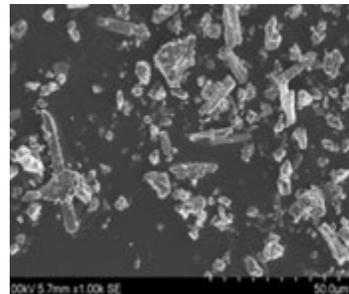
- ZEO holds patent-pending IP for the synthesis of synthetic zeolites from leached spodumene (Li process residue)
- As lithium battery demand grows its anticipated that the lithium refinery sector will produce significant amounts of lithium process residue
- The process of converting spodumene concentrates to lithium hydroxide requires about 7 tonnes of concentrate feed to produce 1 tonne of lithium hydroxide, with the balance tailings
- Dual-feed Pilot program underway Leached Spodumene residue from two (2) lithium hydroxide refineries undergoing bench-scale optimisation



Lithium  
process residue

Leached  
residue

Linde type A  
(4A) zeolite



# Mycotoxin animal feed additives

- Collaboration with Bioproton, a leading & innovative animal feed additives manufacturer (exporting to 45 countries – facilities in Aust / Europe)
- Climate change increasing moulds (fungus) that create mycotoxins, which affect animal health, in turn impacting global protein production
- Mycotoxins reduce weight gain and growth rate and increase mortality
- Mycotoxin additives are increasing being applied to animal feed as a preventative, placing upward pressure on demand
- Global Mycotoxin feed additives market >AUD \$1Bn comprises of:
  - Premium = A\$470m CAGR 7% pa
  - Advanced = A\$470m CAGR 4% pa
  - Simple = A\$160m CAGR 2% pa

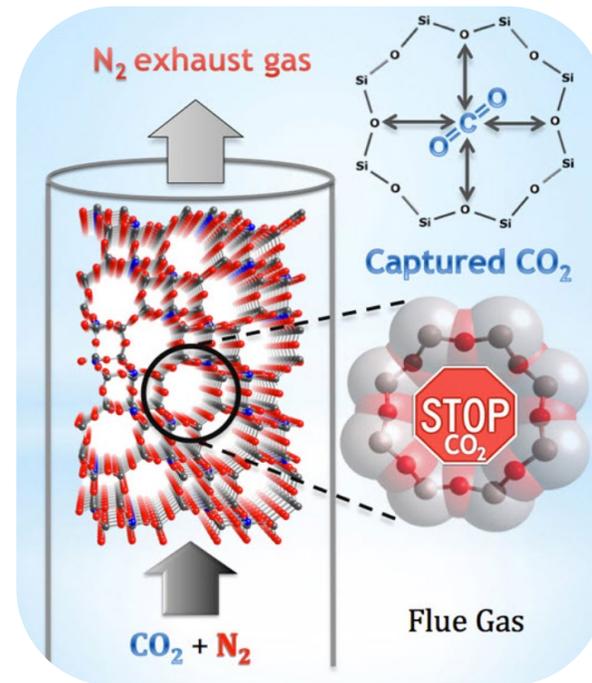


[https://www.dsm.com/content/dam/dsm/corporate/en\\_US/documents/2020-06-12-presentation-to-investors-erber-group-acquisition.pdf](https://www.dsm.com/content/dam/dsm/corporate/en_US/documents/2020-06-12-presentation-to-investors-erber-group-acquisition.pdf)

# CO<sub>2</sub> capture and utilization technology

- UQ research program underway
- Zeolites can capture and “adsorb” CO<sub>2</sub> while allowing other substances through and then under certain conditions release “desorb” CO<sub>2</sub>
- Objective is to improve efficiencies of proven CO<sub>2</sub> separation/capture processes using synthetic zeolites as structured adsorbents to develop economically viable CO<sub>2</sub> capture & utilization technologies
- Potential to explore using zeolites as catalysts to produce value-added chemicals

image source: phy.org news  
<https://phys.org/news/2012-02-octagonal-window-opportunity-carbon-capture.html>



## Newly developed screening processes will accelerate carbon capture research

by Catherine Tays, University of Alberta



University of Alberta research that save a significant amount of efficient carbon capture technology to use the technology way to mitigate carbon dioxide.



TOPICS: Environment Nanotechnology Plastic Pollution Tata Institute Of Fundamental Research

By TATA INSTITUTE OF FUNDAMENTAL RESEARCH JULY 31, 2020

IMAGE: THE NI HYBRID FOAM, CO<sub>2</sub>-ADSORBING ALUMINOSILICATE SHOWN TO HA



<https://phys.org/news/2020-01-newly-screening-carbon-capture.html>

[https://www.eurekalert.org/pub\\_releases/2019-12/cuot-asn120619.php](https://www.eurekalert.org/pub_releases/2019-12/cuot-asn120619.php)

<https://scitechdaily.com/solid-acid-nano-sponges-transform-co2-into-fuel-and-plastic-waste-into-useful-chemicals/>

# Agronomic applications

Pilot trials undertaken by Griffith University reveal potential to develop Zeotech products to offer solutions to large-scale agricultural challenges, driven by promising results:

- Decreased soil acidification
- Enhanced moisture retention
- Pesticide destruction
- High nutrient retention

Outcomes have driven planning on expanded pilots for (new) product development targeting:

- Fertilizer delivery/carbon markets and agricultural pollutants

**Dr. Chris Pratt (GU) commented on Type A zeolite results:**

*“Exceptional phosphate adsorption”*

*“very encouraging pesticide removal not only pesticide removal observed but actual breakdown of the compound”*



# Near term value drivers



- Accelerate DSO marketing strategy
- commence mining plan application
- Set Asian markets representation
- Secure tangible buyer interest



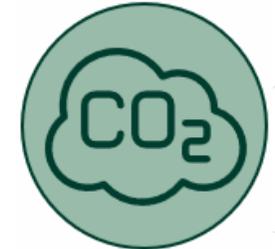
- Share bench-scale optimisation results with 2 x lithium refinery participants
- Complete kaolin and lithium residue bench-scale circuit and commence construction of dual-feed pilot



- Transition to next phase of mycotoxin binder animal feed assessment
- Progress to formalising Bioproton collaboration



- Commence new GU agronomic pilots, targeting:
  - a) fertilizer delivery;
  - b) treatment of agricultural pollutants; and
  - c) carbon markets



- Complete UQ CO<sub>2</sub> capture research program
- Explore CO<sub>2</sub> sequestration in expanded GU agronomic pilot

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# Appendix:

ADDITIONAL INFORMATION

# Corporate snapshot



\$138M (fully diluted)  
MARKET CAPITALISATION



1,485M  
SHARES ON ISSUE



\$5.47M  
CASH AT BANK



\$0  
DEBT



\$0.085  
CURRENT SHARE PRICE

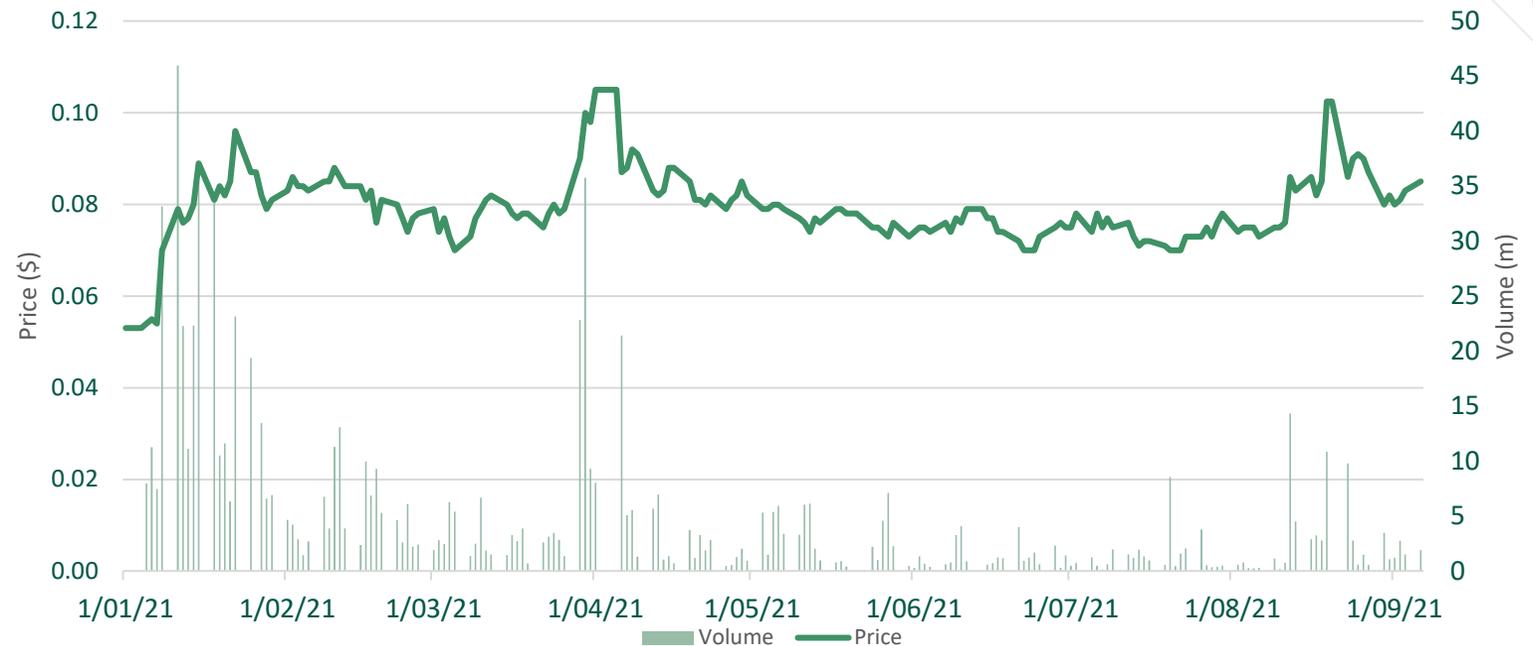
## BOARD & MANAGEMENT

Peter Zardo - Managing Director  
Sylvia Tulloch - Non-Executive Chair  
Rob Downey - Non-Executive Director  
Dr. John Vogrin - Project Manager

## TECHNICAL PARTNERS

The University of Queensland  
Griffith University

### Share price and volume



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## COMPETENT PERSON'S STATEMENT

Information in this presentation relating to resource work for the Toondoon Kaolinite Project is based on information provided by Mr Graham Rolfe (BSc, MSc, FAIG, RPGeo), who has sufficient experience that is relevant to the style of mineralisation and type of deposits under consideration and to the activity being undertaken to qualify as a Competent Person as defined in the 2012 Edition of the "Australian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves". The exploration results such as drill logging and geochemical analyses used in the mineral resource estimate were compiled by Mr Rolfe. Mr Rolfe consents to the disclosure of information in the form and context in which it appears.

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