



MINOTAUR
EXPLORATION

MINOTAUR EXPLORATION LIMITED
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ASX: MEP

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ASX Release

Patent Lodged for Halloysite-Kaolin Conversion to Nanoporous Carbon Materials

Minotaur Exploration (ASX: MEP) is pleased to advise that its jointly owned R&D entity Natural Nanotech Pty Ltd has filed a provisional patent application covering the conversion process for halloysite and halloysite-kaolin into advanced, functionalised carbon nanomaterials.

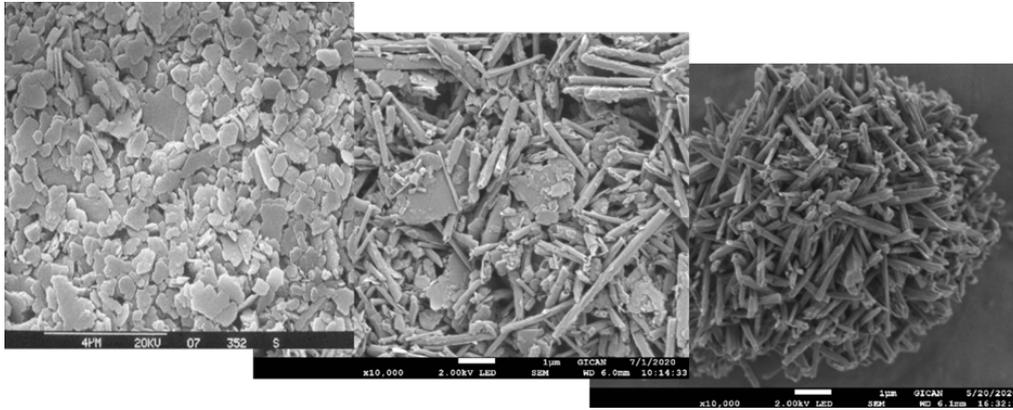
Background

Natural Nanotech Pty Ltd (NNT) is a research and commercialisation venture jointly owned (50:50) by Minotaur Exploration Ltd (ASX: MEP, Minotaur) and Andromeda Metals Limited (ASX: ADN, Andromeda), formed to investigate advanced nanotechnology applications utilising natural halloysite and halloysite-kaolin sourced nanomaterials. MEP and ADN are currently co-funding \$1M per annum into NNT to facilitate commercialisation of new, potentially high-value technologies based on halloysite-kaolin from the Great White project in South Australia.

NNT has been working with the University of Newcastle's Global Innovative Centre for Advanced Nanomaterials (GICAN) for several years on high-tech applications for halloysite, natural clay nanotubes, from the Great White Kaolin JV's high-grade kaolin-halloysite deposits in South Australia. Excellent results are being obtained from the existing JORC Resource by using refined material, purified to improve performance. Work to incorporate recently identified zones of much higher natural purity is proceeding in parallel. A large-scale industrial kaolin processing centrifuge was recently obtained from Europe and is being installed in the \$1M Pilot Plant at Streaky Bay. Once commissioned this will be used to produce large quantities of high-purity halloysite from specially selected feedstock.

Patent Application

Natural Nanotech has lodged a provisional patent covering the processing pathways for conversion of the natural clay nanotube halloysite and halloysite-kaolinite admixtures of varying proportions, into selectively functionalised and chemically activated carbon nanomaterials. Selective functionalisation refers to intended high technology uses for the nanomaterials, with desirable performances documented in the first instance for selective CO₂ adsorption and for specific capacitance and energy storage. Ongoing optimisation of the process continues for hydrogen storage, water and wastewater treatment and agricultural applications.



SEM photographs illustrating varying halloysite:kaolinite content of nanoclay samples from the Great White kaolin-halloysite deposit, western South Australia.

The unique properties of Great White Project halloysite-derived nanomaterials that make them so amenable to these applications are their enormous surface area per unit weight, their porous nature and differential charge capabilities between inner and outer surfaces. The process pathways subject of the patent filing documents how run-of-mine halloysite-kaolin nanoclays comprised of a mixture of flaky and tubular morphology can be converted into carbon nanomaterials through a solid-state templating, doping and activation process to fabricate activated porous nanocarbon materials for the specific applications. The process pathways subject of the patent filing generates nanomaterials with CO₂ adsorption potential in excess of 25 mmol/g and specific capacitance in excess of 220 F/g at a current density of 0.3 A/g.

The global push towards net zero carbon by governments and corporations requires innovative approaches to minimising and removing greenhouse gases from industrial processes of all scales. Carbon Capture & Conversion at the industrial process level, as well as Direct Air Capture of carbon from the atmosphere will allow organisations to ameliorate their carbon footprints by removing carbon equivalent to their industrial, organisational or personal inputs. NNT's carbon amelioration research strategy and the innovative processes subject of the filing are focussed on achieving this outcome by utilising Great White halloysite-kaolin derived nanomaterials as a superior adsorbent. Construction of a Carbon Capture & Conversion pilot plant facility is underway at GICAN in Newcastle, NSW. This scalable facility will be able to demonstrate the capture of large amounts of CO₂ and use a proven conversion method to convert it into a clean fuel, effectively closing the circle of emissions.

Next Steps

Filing a provisional patent application is the first step towards establishing Australian and international Intellectual Property protection. It is followed by a standard patent application and/or international filings within 12 months of the provisional application.

Minotaur's director of Research and Development, Dr Tony Belperio said: It is pleasing to see this critical initial filing of the major research advances made with the GICAN team with a clear focus on potential commercial applications across a range of environmental and technological issues. A carbon capture pilot plant now under construction will rigorously assess the efficacy of the carbon nanomaterials for commercial-scale application in carbon capture and utilisation.

Andromeda's Managing Director James Marsh commented: The research with GICAN and the resultant patent filing addresses the need for improved methods for the fabrication of nanoporous carbon materials having high specific surface area, large pore volume and improved surface functionalities. Most importantly, it delivers these major advances utilising a low-cost and naturally available, benign clay material precursor while protecting the potentially very valuable intellectual property for the benefit of all ADN and MEP company shareholders.

Authorisation

This report is authorised by Mr Andrew Woskett, Managing Director of Minotaur Exploration Ltd.

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