



## Epichem Licensing Agreement to Develop Waste to Fuels Technology

- Epichem has entered into a license agreement with Thermaquatica for the Oxidative Hydrothermal Dissolution (OHD) technology
- Epichem will research, develop and promote the novel, innovative, disruptive technology using Flow Reaction
- Epichem will continue to seek government and project grant funding to accelerate the initiative

**23 March 2021 – Perth, Australia:** Epichem Pty Ltd, through its subsidiary Epichem OHD Pty Ltd, has entered into a licensing agreement with Illinois-based Thermaquatica Inc to research, develop and promote a novel, innovative and disruptive waste to fuels technology.

Epichem Pty Ltd is a wholly owned subsidiary of PharmAust Limited (ASX:PAA)

Epichem OHD will advance the novel, disruptive and innovative OHD technology using biomass/feedstock flow reactor material science. The flow reactor is a world-first with its potential to turn a wide range of waste and biomass feedstock into valuable fuels, fine chemicals, agricultural growth stimulants and ethanol.

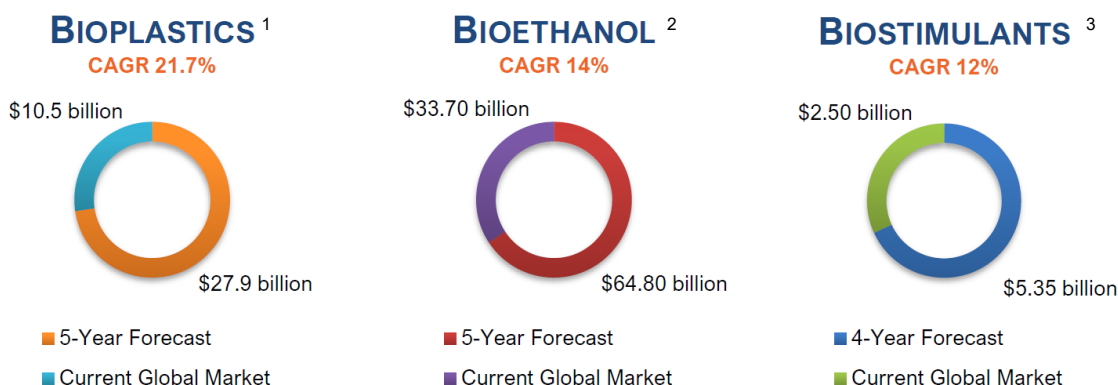
Epichem OHD is capitalising on recent Australian policies at national, state and local government levels towards zero organic waste to landfill.

The benchtop flow reactor under development will be carbon neutral, environmentally sustainable and uses oxygen and water at high temperature and pressure to break down input materials and form useful end products.

The flow reactor has the potential to convert:

- Plastics into renewable fuels
- Coal into diesel or agricultural biostimulants (diesel, fine chemicals and biostimulants)
- Rubber tyres into liquid fuels/valuable chemical products
- Trees into cellulosic ethanol/fine chemicals
- Leftover stock or crops into liquid fuel – cellulosic ethanol and agricultural biostimulants.

### GLOBAL MARKET OPPORTUNITIES



<sup>1</sup> Source: Reportlinker – Bioplastics & Biopolymers Market by Type, End-Use Industry, Region - Global Forecast to 2025

<sup>2</sup> Source: Reportlinker – Bioethanol Market by Feedstock, End-Use Industry, Fuel Blend and Region - Global Forecast to 2025

<sup>3</sup> Source: Technavio – Global Biostimulants Market 2020-2024

The technology used in the flow reactor could also be used to enhance the process of carbon storage in soils. It may also have application in the minerals recovery sector.

“There are many things the flow reactor appears to be able to convert - we are eager to learn more of its capabilities and applications,” said Epichem CEO, Colin La Galia. “The flow reactor could make a significant contribution in the capability to deal with waste and produce diesel, liquid fuels, biofuels, liquid fertilisers and biostimulants.”

The technology is a novel invention from US-based Australian Ken Anderson, Founder and Chief Technology Officer of Thermaquatica Inc, under a licence agreement and patented IP.

Mr La Galia said, “The OHD technology will help support Australia’s focus on sovereign capability to produce our own ethanol for our PPE requirements including the manufacture of hand sanitiser.”

“It has the ability to support and sustain industries, provide innovative, disruptive technology in Australia, can be scaled up for a range of industry partners and create employment opportunities in WA and Australia.”

The technology has the potential to create new revenue streams from:

- Removal of organic waste
- Conversion of organic waste to valuable end user products
- Reduce landfill

Epichem was awarded a \$200,000 WasteSorted e-Waste Grant from the Western Australian Government New Industries Fund in January 2021. The Company continues to seek other government grants and funding support to advance this initiative.

Epichem CEO Colin La Galia said, “Epichem welcomes the opportunity to work in partnership with Thermaquatica and share our technology, science and chemistry capability and expertise to develop this potential high impact technology.”

Thermaquatica Founder Ken Anderson said, “We are excited to be working with Epichem OHD to promote and advance our technology that has potential to deliver major benefits including energy, waste, recycling and agtech.”

## **KEY MATERIAL TERMS OF THE LICENSE AGREEMENT**

- Epichem OHD Pty Ltd has entered into an exclusive sub-license with Thermaquatica Inc for the Oxidative Hydrothermal Dissolution technology
- Epichem OHD Pty Ltd is a wholly owned subsidiary of Epichem Pty Ltd
- Epichem is a wholly owned subsidiary of PharmaAust Limited
- Southern Illinois University owns the patent rights developed at the university and entered into a Patent License Agreement (“Master License”) with Thermaquatica Inc
- An initial licence execution fee payable of USD25K
- An annual licence fee payable of USD125K
- The term of the Agreement is five (5) years with an automatic renewal for up to four (4) additional three (3) year periods
- Epichem has the ability to perform fee-for-service projects using the technology on behalf of other parties
- Licensed territories include: Australia, New Zealand, Singapore, Hong Kong and Taiwan
- Very broad licence field defined as;
  - Unlimited use of the OHD technology for any purpose and using any feedstock. This shall include, but not be limited to, the following:
    - Processing of feedstocks to:
      - o Produce high value products including, but not limited to, agricultural products, bio-stimulants, chemicals, fuels, materials, energy (including heat) and other products. High value to be defined as commercial and non-commercial value where non-commercial value includes products that have environmental, social or other value

- o Reduce, remove, eliminate or otherwise modify carbon containing matter for the purpose of increasing the value of a volume of, and/or reducing the liability of, a volume of matter; including but not limited to, reducing the cost of disposal and/or reducing any negative environmental impacts
- o Investigate chemical and physical changes to feedstocks for scientific research
- o Any other purpose not specified above
  - Processing of feedstocks, including, but not limited to, the following:
    - o Fossil fuels, carbonaceous deposits, petroleum and petroleum-like matter, including, but not limited to, coal (all grades), bituminous sands, oil shale and peat.
    - o Biomass, including, but not limited to, lignocellulosic matter, plant matter, fungal matter, insects and insect products including exuviae and frass, agricultural materials, products and wastes, industrial materials, products and wastes, municipal waste, office waste, and other matter derived from fungi, animals, plants, protozoa and archaea.
    - o Industrial, municipal, office and other waste including, but not limited to, paper and cardboard waste, textile waste, electronic waste (e-waste), plastic waste, green waste, agricultural waste, food waste, rubber waste including used tires, shellfish waste, sewerage sludge, drill mud and tailings.
    - o Other carbonaceous materials including, but not limited to the following: wood pulp, black liquor, plastic, and other carbon containing matter.
    - o Any feedstocks not specified above.

**This announcement is authorised by the Board**

**Enquiries:**

**Dr Roger Aston**  
**Executive Chairman and CEO**  
**PharmAust Limited**  
**Tel: 0402 762 204**  
[rogeraston@pharmaust.com](mailto:rogeraston@pharmaust.com)

**Mr Colin La Galia**  
**Chief Executive Officer**  
**Epichem Pty Ltd**  
**Tel: 0419 941 301**  
[colin.lagaliam@epichem.com.au](mailto:colin.lagaliam@epichem.com.au)

**About PharmAust (PAA):**

PharmAust Limited is listed on the Australian Securities Exchange (code: PAA) and the Frankfurt Stock Exchange (code: ECQ). PAA is a clinical-stage company developing therapeutics for both humans and animals. The company specialises in repurposing marketed drugs lowering the risks and costs of development. These efforts are supported by PAA's subsidiary, Epichem, a highly successful contract medicinal chemistry company which generated \$3.5 million in revenue in FY 2020.

PAA's lead drug candidate is monepantel (MPL), a novel, potent and safe inhibitor of the mTOR pathway – a pathway having key influences in cancer growth and neurodegenerative diseases. MPL has been evaluated in Phase 1 clinical trials in humans and Phase 2 clinical trials in dogs. MPL treatment was well-tolerated in humans, demonstrating preliminary evidence of anticancer activity. MPL demonstrated objective anticancer activity in dogs. PAA is uniquely positioned to commercialise MPL for treatment of human and veterinary cancers as well as neurodegenerative disease as it advances a reformulated version of this drug through Phase 1 and 2 clinical trials.

**About Epichem:**

Epichem is a wholly owned subsidiary of the ASX listed company PharmAust Limited. Located in Technology Park, Western Australia, Epichem has been delivering products and services in synthetic and medicinal chemistry to the global drug discovery and pharmaceutical industries in over 40 countries worldwide for over 17 years. Epichem has newly constructed purpose-built, state-of-the-art laboratories and has world class equipment and expertise in synthetic and medicinal chemistry to support drug discovery projects, and for the cost-effective synthesis of drug analogue libraries and intermediates. It also has a rapidly growing catalogue of pharmaceutical reference standards. Epichem has expanded its chemistry capability and expertise to include material science applications to the Energy, Resources, Waste, Recycling and AgTech sectors. Epichem is the winner of the WA Industry Export Award 2019 for International Health, the 2020 Inspiring Story of Celebrating Remarkable Resilience Nomination for WA for the Australian Export and Investment Awards and the 2020 GHP Biotechnology Award winner for Most Innovative Chemistry Service Provider – Australia and Best in Organic Chemistry Solutions 2020.

For more information, visit [www.epichem.com.au](http://www.epichem.com.au)

**About Thermaquatica, Inc.:**

Thermaquatica was founded in 2010 by Ken Anderson PhD and is the exclusive provider of Oxidative Hydrothermal Dissolution (OHD) technology, an environmentally benign method for the production of high value chemical products from coal, biomass and other low value organic feed stocks. Among other applications, this technology has the potential to enable the use of coal and biomass as a replacement for petroleum-derived raw chemical feed stocks and liquid fuels. Dr. Anderson is also a professor of geochemistry at Southern Illinois University's Carbondale, Illinois campus.

For more information, contact Dr. Anderson at [kanderson@thermaquatica.com](mailto:kanderson@thermaquatica.com)

**About Southern Illinois University:**

Southern Illinois University's (SIU) Carbondale campus was founded in 1869 and is located in the heart of the State of Illinois' principal coal region. The SIU System is made up of SIU Carbondale, the SIU School of Medicine based in Springfield, and SIU Edwardsville, which includes the SIU School of Dentistry based in nearby Alton, IL. The system employs more than 7,000 faculty and staff who serve more than 28,000 students.