NATURE MATERIALS PUBLISHES REVOLUTIONARY LITHIUM EXTRACTION TECHNIQUE TO POWER THE FUTURE

Austin, Texas: Lithium underpins the batteries needed to power the world's growing demand for millions of electric vehicles (EVs), smart devices, and grid storage. This valuable material could one day be extracted from lithium salt brine in days, rather than years, and with up to 300% higher recovery rate.

Thanks to advanced filtering and direct extraction techniques being developed and commercialized by Energy Exploration Technologies (EnergyX) in collaboration with researchers at Monash University, CSIRO (The Australian National Laboratory), and the University of Texas at Austin, there now seems to be a solution to the undersupplied, quintessential battery material.

Supplying enough raw materials to produce energy-efficient lithium-based batteries and energy storage systems is a growing challenge. If solved, this technology will help the world transition to cleaner energy.

"Lithium is a vital mineral for US energy security, and this technology allows us to extract it in a more sustainable and efficient way," says Teague Egan, founder, CEO, and product architect of EnergyX. "An estimated $15-20 billion dollars of investments into lithium infrastructure is needed by 2025 to meet growing demand. In 2018 there were 270,000 tons of lithium produced, by 2030 demand is projected at over 2,000,000 tons. EnergyX's breakthrough technology is ensuring we can meet that demand."

The world-first study published March 9, 2020 in the prestigious international journal Nature Materials presents radical new findings representing several years of work. It demonstrates methods of mechanically extracting lithium from salt brines using an advanced nanomaterial called Metal-Organic Frameworks (MOFs). Inspired by the precise filtering capabilities of a living cell, the MOFs are somewhat of a 'miracle material.' They mimic the filtering function, or 'ion selectivity', of a biological cell membrane. The research team has developed a synthetic MOF membrane that is precisely tuned, in both size and chemistry, to filter lithium molecules in an ultra-fast, one-directional, and highly selective manner.

"Based on this new research, we could one day have the capability to produce simple filters that will take hours to extract lithium from brine, rather than several months to years," said Professor Wang. This offers industry a significant new avenue for faster production and growth, with less environmental impact.

Professor Freeman added, "Thanks to the international, interdisciplinary, and collaborative team involved in this research, we are discovering new routes to very selective separation membranes. We are both enthusiastic and hopeful that the strategy outlined in this paper will provide a roadmap for low energy water purification and resource recovery of many different molecular species."

Earlier in 2019, EnergyX executed a worldwide exclusive license to commercialize the technology. The company has built an impressive portfolio of patents around the core technology, and created relationships with top membrane experts and key manufacturing partners to accelerate the road to commercialization. EnergyX is already in conversations with some of the world's largest lithium production companies and has letters of intent for deploying onsite pilot plants utilizing MOF technology.

Environmental impact plays a big role in EnergyX's commercialization efforts. While conventional evaporation methods produce sizable waste and require large amounts of fresh water, sometimes up to 17,000 gallons per ton, in areas already with water scarcity, EnergyX uses minimal water with no chemicals. On top of that EnergyX calculated per EPA statistics, that every ton of lithium utilized in batteries for EVs annually displaces 134,000 tons of CO_2 which would otherwise be emitted by internal combustion engines (this calculation assumes the energy charging an EV is not from renewable sources).

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A time and labor intensive process, conventional methods largely found in the South American 'Lithium Triangle' nations of Bolivia, Chile and Argentina, pump brines to the surface then slowly move through a series of massive evaporation ponds with chemical treatments added. Brine remains in the ponds for a period of 18-24 months, and has a lithium recovery rate usually as low as 30%. Revolutionary MOF technology embedded in membranes can increase that to approximately 90%.

"It's truly an honor to collaborate with such brilliant scientists at all these organizations. In working with Dr. Freeman on a daily basis, who chairs our Science Advisory Board, I'm constantly amazed by the intuitive creativity it takes to form novel art," said Egan. "This breakthrough innovation will change the way lithium is produced and how we power our future."

To download a full copy of the research: https://www.nature.com/articles/s41563-020-0634-7

Learn more on the company website: www.energyx.com

This study was led by Professor Huanting Wang, Dr. Huacheng Zhang and Professor Xiwang Zhang from the Department of Chemical Engineering at Monash University, in collaboration with Dr. Anita Hill of CSIRO Future Industries; Associate Professor Matthew Hill of CSIRO and Monash University; Professor Benny Freeman of the McKetta Department of Chemical Engineering in the Cockrell School of Engineering at The University of Texas at Austin; and Associate Professor (Jefferson) Zhe Liu of The University of Melbourne.

For further information, exclusive insights, and media enquiries, or to set up an interview with Dr. Benny Freeman, Dr. Huanting Wang, or EnergyX CEO Teague Egan, please contact:

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