



Jetti Publishes Groundbreaking Scientific Paper on Chalcopyrite Leaching in Acta Materialia

19 July 2022 - Jetti Resources ("Jetti") and the University of British Columbia ("UBC") are pleased to announce the publication of groundbreaking scientific research that underpins Jetti's technology for enabling copper production from low-grade primary sulfide ores, such as chalcopyrite. Chalcopyrite is the world's most abundant copper ore, and additional production from this newly available resource could significantly increase copper output from existing mines to meet the growing needs of the green energy transition.

The peer reviewed paper, which has been published in Acta Materialia, sheds new light on how chalcopyrite behaves when subject to leaching and provides a better understanding of the nature of the passivation layer, which has been the topic of debate and dispute for several decades. The passivation layer forms on the surface of chalcopyrite and other primary sulfide minerals, preventing leaching from occurring effectively.

In the study, Jetti's team used electrochemical analysis to discover that chalcopyrite is an n-type semiconductor in an accumulation state, not in a depletion state as has been commonly assumed to date. Jetti's researchers demonstrated how during oxidative leaching, such as bioleach or chloride leach processes, a copper rich surface forms on the surface of the chalcopyrite. This rich product layer is a p-type semiconductor. Careful analysis of the data allowed the scientists to discover that, as leaching progresses, the n-type semiconductor chalcopyrite surface and the p-type semiconductor of the product layer form a p-n junction diode which hinders the electrochemical leaching process as it blocks the transfer of electrons. This novel understanding of the passivation layer demonstrates Jetti's unmatched expertise in the science behind copper leaching.

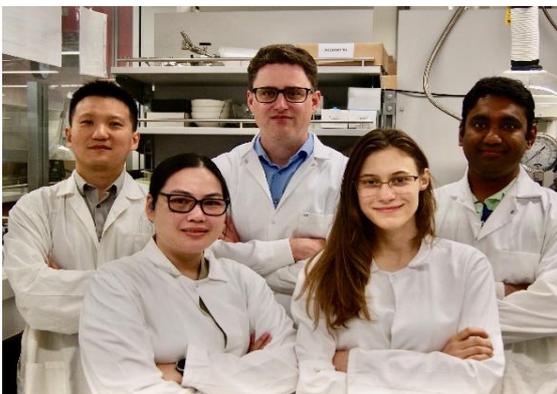


Figure 1: Jetti's research team (from left to right: Dr. Zihe Ren; Chihwei Chao; Prof. Edouard Asselin, Julia Grabovac and Prashanth Krishnamoorthy. Not pictured: Prof. David Dixon and Dr. Nelson Mora)



Figure 2: Jetti's Chief Scientist Dr. Zihe Ren conducting laboratory work related to the study

Jetti's proprietary catalytic technology has already been proven to enable commercial copper production from chalcopyrite ore. The research published in Acta Materialia provides the scientific backbone supporting Jetti's innovative technology which solved a problem that the industry had faced for more than 50 years.

Chalcopyrite comprises around 70% of remaining global copper reserves. Unlocking the copper trapped in these difficult ores will be key to the electrification of the global economy.

The paper is titled "The overlooked mechanism of chalcopyrite passivation" and is available [here](#).

Mike Outwin, CEO of Jetti said: "This research clearly illustrates the unrivalled technical understanding that Jetti and UBC have built in copper leaching. Jetti's catalytic technology has been commercially producing copper for years, and this unique insight will enable us to further enhance our technological leadership to meet growing demand for copper from the energy transition."

"Jetti's technology remains the best available option for enabling the industry to rapidly produce the copper the world needs to power the energy transition efficiently and sustainably."

Nelson Mora, Chief Technology Officer of Jetti said: "We are thrilled to publish this research in a top ranked scientific journal in metallurgy and metallurgical engineering. The new findings outlined in the paper are a testament to the deep expertise and tireless endeavors of the Jetti and UBC teams over many years."

Professors David Dixon and Edouard Asselin from UBC said: "Working in partnership with the Jetti team, we have solved the issue that has long been described as the "holy grail" of the copper industry. Our research enables a much fuller understanding of the process involved in copper leaching and cements UBC's position as the world's leading hydrometallurgical research institute. We look forward to continuing our long partnership with Jetti."

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Notes to editors:

Jetti Resources

Jetti Resources is a technology-driven natural resources company headquartered in Boulder, Colorado, USA. The Company's commercially proven and proprietary catalytic technology addresses the key technical problem preventing recovery of trillions of dollars of trapped resources.

Jetti currently applies its catalyst to hundreds of millions of tons of ore, significantly increasing copper yields in a cost-effective and environmentally responsible manner. The Company was founded by CEO Mike Outwin and Board Member Andrew Perlman in 2014. Investors in Jetti include Mitsubishi, BHP, Freeport-McMoRan, and Teck Resources.

CRU defined Jetti's Total Addressable Market through to the end of 2050 as 234Mt of contained copper, which Jetti estimates at current copper prices to be worth approximately \$2 trillion.