THE FINAL WORD

The official e-newsletter
of
Industrial Chemistry (IC) Department,
ISTAR, CVM University,
Vallabh Vidyanagar, Anand, Gujarat
E-Mail : headic@istar.edu.com
Visit us on : http://istar.edu.in/IC/index.htm

January 2021

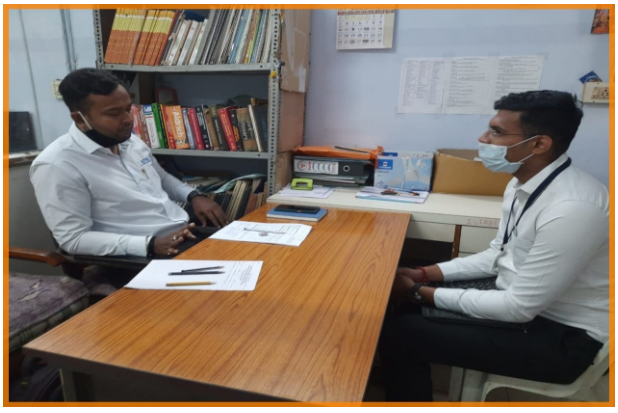
M. Sc. Industrial Chemistry

Campus Placement - 2021

Different industries have visited our department for campus interview and selected **23** Students of Semester 4. Student learnt so many things from this interview.





Department of Industrial Chemistry

Article

Fungi recycle rechargeable lithium-ion

Summary: Rechargeable batteries in smartphones, cars and tablets don't last forever. Old batteries often wind up in landfills or incinerators, potentially harming the environment. And valuable materials remain locked inside. Now, a team of researchers is turning to fungi to drive an environmentally friendly recycling process to extract cobalt and lithium from tons of waste batteries.

"The idea first came from a student who had experience extracting some metals from waste slag left over from smelting operations," says Jeffrey A. Cunningham, Ph.D., the project's team leader. "We were watching the huge growth in smartphones and all the other products with rechargeable batteries, so we shifted our focus. The demand for lithium is rising rapidly, and it is not sustainable to keep mining new lithium resources".

Although a global problem, there are some countries who leads the way as the largest generator of electronic waste. It is unclear how many electronic products are recycled. Most likely, many head to a landfill to slowly break down in the environment or go to an incinerator to be burned, generating potentially toxic air emissions.

While other methods exist to separate lithium, cobalt and other metals, they require high temperatures and harsh chemicals. Resercher's team is developing an environmentally safe way to do this with organisms found in nature -- fungi in this case -- and putting them in an environment where they can do their work. "Fungi are a very cheap source of labor," they pointed out.

To drive the process, Researcher of both the University of South Florida, are using three strains of fungi - *Aspergillus niger*, *Penicillium simplicissimum* and *Penicillium chrysogenum*. "They selected these strains of fungi because they have been observed to be effective at extracting metals from other types of waste products". "We reasoned that the extraction mechanisms should be similar, and, if they are, these fungi could probably work to extract lithium and cobalt from spent batteries."

The team first dismantles the batteries and pulverizes the cathodes. Then, they expose the remaining pulp to the fungus. "Fungi naturally generate organic acids, and the acids work to leach out the metals". "Through the interaction of the fungus, acid and pulverized cathode, we can extract the valuable cobalt and lithium. We are aiming to recover nearly all of the original material."

Results so far show that using oxalic acid and citric acid, two of the organic acids generated by the fungi, up to 85 percent of the lithium and up to 48 percent of the cobalt from the cathodes of spent batteries were extracted. Gluconic acid, however, was not effective for extracting either metal.

The cobalt and lithium remain in a liquid acidic medium after fungal exposure. Now their focus is on how to get the two elements out of that liquid. So by using sulfuric acid via extraction they separate lithium and cobalt from the acid solution.

The pH range of sulfuric acid is 3.5 and it gives almost 90.02% cobalt and 86.04% lithium recovery from acid

They are the only one studying fungal bioleaching for spent rechargeable batteries.

- Aishwarya Patel
(20IC04)