

## Citrus solutions: Using orange peels to recycle precious metals

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We recently wrote about [bacteria](#) being used to extract precious metals from e-waste. Now, organic compounds are once again coming to the rescue to recycle valuable materials. Researchers at the Nanyang Technological University are using orange peels to extract precious metals from spent batteries.

Traditionally, used batteries are heated to high temperatures so that the previous metals melt and run out of them to be reused. As you can imagine, this process is energy intensive and also releases toxic gases. Another option is to shred the batteries and mix them with acids and hydrogen peroxide to separate out metals. With this method in mind, researchers wondered if the acid from citrus could be substituted for the more toxic ingredients.

The researchers used powdered orange peels and citric acid from the fruit to successfully extract about 90 percent of the lithium, cobalt, nickel and manganese from spent lithium-ion batteries. This is on par with the extraction rate of other methods and, more importantly, the residue created is non-toxic.

Finding more eco-friendly solutions to repurpose materials, rather than mine virgin metals, is great for the planet and cost effective. The humble orange peel, most often thrown away, is a cheap and efficient replacement for a traditionally expensive and toxic process.

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