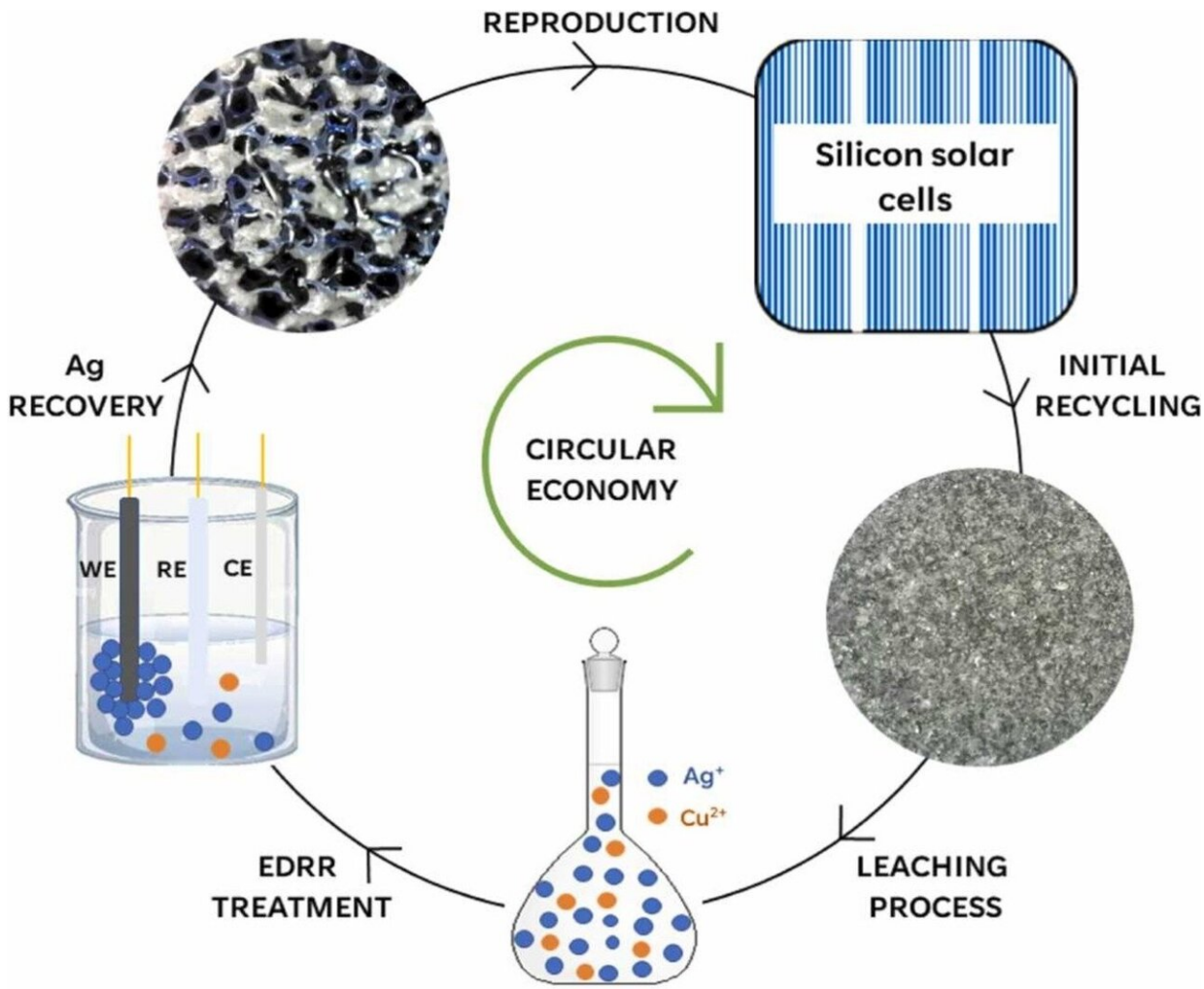
A way to recover silver from dead solar panels with 98% efficiency

August 28 2024, by Bob Yirka



Credit: *Environmental Technology & Innovation* (2024). DOI: 10.1016/j.eti.2024.103803

A multi-institutional team of chemists, metallurgists and engineers has developed a highly efficient way to retrieve silver from dead solar panels. Their paper is published in *Environmental Technology & Innovation*.

As climate change progresses, scientists seek to replace fossil fuels with renewable resources, including solar power. But the development of these technologies has led to new environmental problems, such as what to do with solar panels after their useful life expires.

Prior research has shown that some solar panel components are relatively easy to recycle, including the iron, steel and aluminum used to make brackets, racks and other support systems.

Unfortunately, other components are more challenging to recover, such as the silver used in electrical circuits—it must be separated from the circuitry and the copper that is almost always present. Thus, these materials are seldom recycled. In this new study, a team in Italy developed a relatively inexpensive way to recover the silver used in solar panels.

The process involves the use of a base-activated persulfate along with ammonia. In this way, the persulfate could serve as the oxidizing agent. As a reaction proceeds, copper oxide is produced, which serves as a protective layer, preventing leaching of the copper.

To find the right amounts of each of the materials to use in the process, the researchers conducted multiple reactions using different variables, such as ammonia concentrations, while keeping other variables such as stirring speed and temperature even.

After much experimentation, the team found the right combination of factors—ammonia at a concentration of 0.5 M and potassium persulfate

at 0.2 mol per liter, and a reaction time of one hour. Under these conditions, the reaction results in the separation of 85% of the silver in a sample.

The team then carried out an electrodeposition-redox replacement to increase the percentage to 98.7%. Via scanning electron microscope, the team confirmed the enrichment of the silver particles.

More information: Raffaele Emanuele Russo et al, Silver recovery from silicon solar cells waste by hydrometallurgical and electrochemical technique, *Environmental Technology & Innovation* (2024). DOI: 10.1016/j.eti.2024.103803

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