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16765

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# Methods and Apparatuses for Making Cathodes for High-temperature, Rechargeable Batteries

## SUMMARY

Traditional molten salt batteries typically use a tubular design. Therefore, traditional approaches and apparatuses for fabricating cathodes have accommodated tubular batteries. The technique for forming cathodes in molten salt batteries is to place granules of a transition metal and an alkali metal halide in the batteries and to vacuum infiltrate the granules with a molten salt. This technique requires plumbing for the molten salt and can result in inexact amounts of the salt because the amount added cannot be precisely controlled.

Researchers at PNNL have developed improved methods and apparatuses for making cathodes for high-temperature, rechargeable batteries that can be adapted to improve control over cathode composition and to better accommodate batteries of any shape and their assembly.

The approach utilizes a mixture of three solids. The first solid is an alkali metal halide, the second solid is a transition metal, and the third solid is an alkali metal aluminum halide, all of which are then combined into a mixture. The mixture can be heated in a vacuum to a temperature that is greater than or equal to the melting point of the third solid. When the third solid is substantially molten liquid, the mixture is compressed into a desired cathode shape and then cooled to solidify the mixture into the desired cathode shape. An additional benefit is that fabrication of the cathodes can occur in a separate operation from assembly of the batteries containing the cathodes.

## ADVANTAGES

- \* Composition of cathode can better accommodate battery shape.
- \* Cathodes and batteries can be fabricated separately.



## Patents & Intellectual Property

» 8,728,174

## Technology Portfolio(s)

» Energy Storage

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