Digital microscale electrochemical energy storage devices

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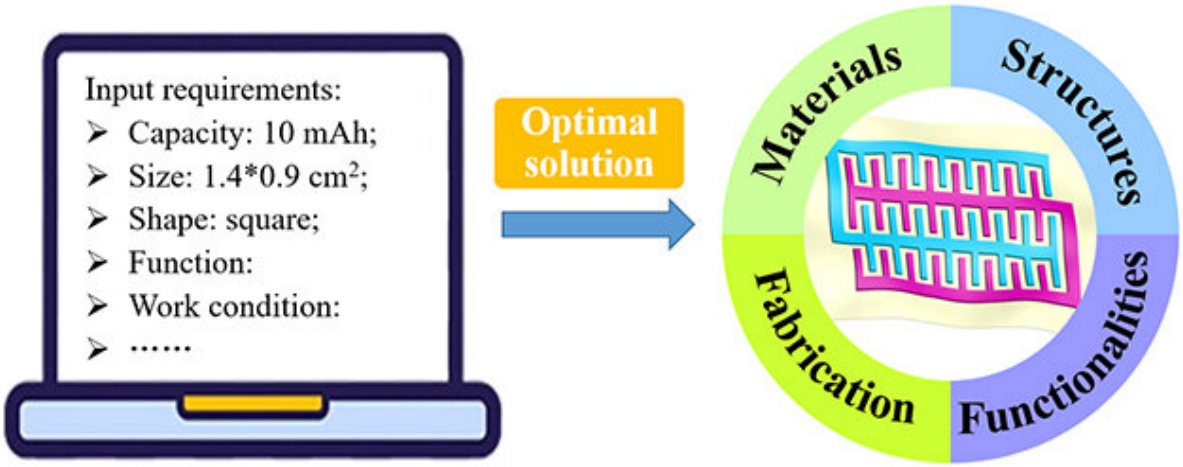

Ideal construction process of digital microscale electrochemical energy storage devices. Credit: Shi Xiaoyu and Hou Xiaocheng

With the development of the internet of things and information technology, it can be foreseen that we will enter a digital, intelligent and fully connected world.

In the future, we may monitor our health status through wearable devices , cure diseases with the aid of advanced implanted microelectronics, obtain real-time information about the surrounding environment by

means of multi-node sensors, all of which require a large number of microscale electronic terminals as support.

Recently, a research team led by Prof. Wu Zhongshuai from the Dalian Institute of Chemical Physics (DICP) of the Chinese Academy of Sciences (CAS) clarified the importance of digital microscale electrochemical energy storage devices, a component of microscale electronic systems.

This work was published as a focus review in *ACS Energy Letters* on Dec. 15.

The researchers indicated that a fully connected and intelligent world required different electronic devices to possess highly designable and customizable properties, in order to achieve seamless integration and assimilation into various situations. Meanwhile, these requirements highly depended on the applicability of microscale electrochemical energy storage devices with the innovative all-around digitalization.

They summarized the current status and latest progress of digital microscale electrochemical energy storage devices from key materials, device geometries, structure engineering, fabrication process, functional characteristics and system integration. And they further discussed the respective design principles and promising development directions.

They pointed out that it was a prerequisite to establish evaluation standards, and the enrichment of analysis methods and the introduction of machine learning technology were powerful means to realize the digitization of microscale electrochemical energy storage devices.

"We also proposed the future development direction and challenges of the digital microscale electrochemical energy storage devices in this work," said Prof. Wu.

More information: Xiaoyu Shi et al, Digital Microscale Electrochemical Energy Storage Devices for a Fully Connected and Intelligent World, *ACS Energy Letters* (2021). DOI: 10.1021/acsenergylett.1c01854

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