

# **Can all-vanadium liquid flow batteries withstand low temperatures**





## Overview

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Can a vanadium redox flow battery predict low temperatures?

In this paper, we present a physics-based electrochemical model of a vanadium redox flow battery that allows temperature-related corrections to be incorporated at a fundamental level, thereby extending its prediction capability to low temperatures.

Does electrolyte viscosity affect the performance of vanadium flow batteries?

Abstract: The performance of vanadium flow batteries (VRFB) can be severely reduced when operating at low temperatures due to changing electrolyte properties. In this work, we develop a non-isothermal model of VRFB dynamics that takes into account changes in electrolyte viscosity depending on temperature.

What are vanadium redox flow batteries (VRFBs)?

Vanadium redox flow batteries (VRFBs) are one example of redox flow batteries that have reached the stage of commercial deployment for grid-scale application. Extensive research has been carried out on several variants of VRFB over the past few decades.

What is the operational temperature of vanadium electrolyte?

The operational temperature of vanadium electrolyte was extended to  $-5\sim 45$  °C. Electrochemical characterization confirmed that WTR-electrolyte has comparable performance to the conventional electrolyte at  $100\text{ mA cm}^{-2}$ , while not sacrificing performance.



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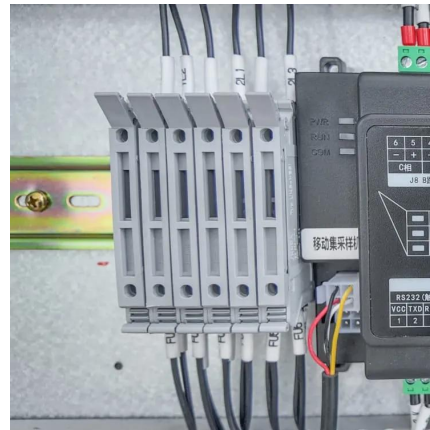


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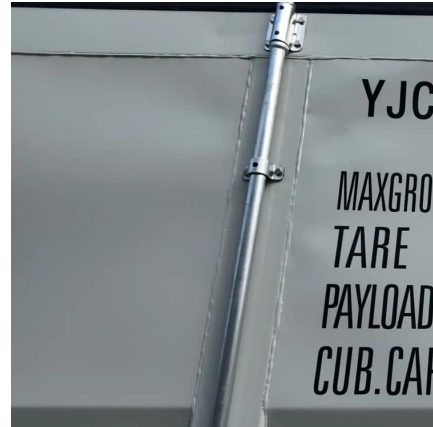
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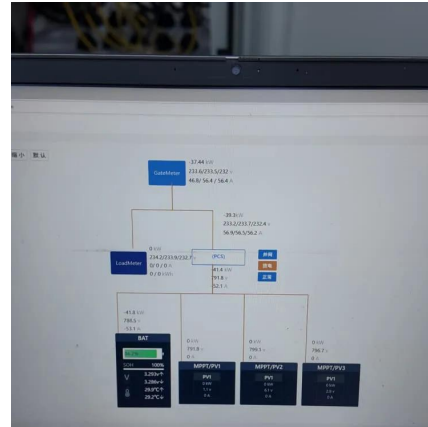
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