

Seawater-Based 2D Transition Metal Supercapacitor

Technology Domain: Electrical Engineering

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Status (Patent/TRL): Patent Pending / TRL 3

Technology Summary:

This invention details a novel two-dimensional transition metal based asymmetric supercapacitor (ASC) that significantly advances energy storage technology. The key technical solution involves fabricating the ASC using 1T/2H MoS₂ as the positrode and Ti₃C₂T_x MXene as the negatrode, crucially employing seawater as the electrolyte.

This unique combination of materials and electrolyte is the central inventive feature, aiming to enhance electrical conductivity, affordability, and overall performance. Extensive characterization and electrochemical testing confirmed the successful synthesis and robust performance of the device, with the ASC demonstrating a specific capacitance of 18 F g⁻¹ at 1 A g⁻¹, an impressive energy density of 9 Wh kg⁻¹ at 1125 W kg⁻¹ power density, and maintaining 34% capacitance after 5,000 cycles.

This development represents a promising step towards developing new, sustainable, and cost-effective electrochemical energy storage devices, particularly for applications requiring high power and rapid charge/discharge in accessible and environmentally friendly systems.

