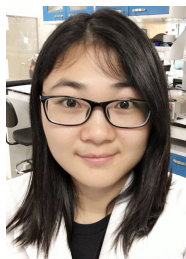


# Vanadium Oxide Nanosheets for Flexible Dendrite-Free Hybrid Aluminium-Lithium-Ion Batteries with Excellent Cycling Performance



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The front cover artwork is provided by Pooi See Lee's group. The image shows the hybrid Al-Li-ion batteries with Al as anode and mixed  $\text{Al}^{3+}$  and  $\text{Li}^+$  ions based electrolyte. Owing to the low cost, high volumetric capacities and dendrite-free characteristics of Al as anode and improved kinetics of utilizing the mixed electrolytes, the hybrid Al-Li-ion batteries deliver competitive advantages among various energy storage devices. Read the full text of the article at [10.1002/batt.201800108](https://doi.org/10.1002/batt.201800108).

## What is the most significant result of this study?

This study demonstrates the concept of hybrid Al-Li-ion battery. At the cathode side,  $\text{Li}^+$  ions will dominate the intercalation/deintercalation sites due to faster ion mobility of  $\text{Li}^+$  compared to that of  $\text{Al}^{3+}$ , thus contributing to improved kinetics. At the anode side, Al deposition/plating occurs without dendrite formation because of higher thermodynamic redox potential of  $\text{Al}/\text{Al}^{3+}$  compared to  $\text{Li}/\text{Li}^+$ . Thus, the hybrid Al-Li-ion battery provides the merits of safety, cost-effective and improved kinetics, presenting highly competitive advantages among various energy storage devices.

## How would you describe to the layperson the most significant result of this study?

In this study, Al foil can be safely handled and directly utilized as anode without further preparation process, thus simplifying the manufacture procedure of batteries. It should be mentioned that unlike Li metal, there is no dendrite formation on Al

foil during charge/discharge, indicating no short circuit after cycling and therefore enhancing safety. The drawback of Al-based batteries is the low ion mobility of  $\text{Al}^{3+}$ , which can be circumvented by incorporation of  $\text{Li}^+$  into electrolyte. Thus, the hybrid battery combines the merits of Al-ion battery and Li-ion battery.

## What aspects of this project do you find most exciting?

Improved kinetics, enhanced capacities and superior cycling performance can be achieved after introduction of  $\text{Li}^+$  ions into Al-ion electrolytes, which could be ascribed to the faster ion mobility of  $\text{Li}^+$  ions compared to that of  $\text{Al}^{3+}$  ions.

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