

## High-Performance Non-aqueous Organic Redox Flow Battery in Ambient Condition

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**Abstract :** Redox flow battery (RFB) is a preferred energy storage option for grid stabilisation and energy arbitrage as it offers energy and power decoupling. In contrast to aqueous RFBs (ARFBs), nonaqueous RFBs (NARFBs) could offer high energy densities due to the wider electrochemical window of the solvents used, which could handle high and low voltage organic redox couples without undergoing electrolysis. In this study, a RFB based on benzyl viologen hexafluorophosphate [BV(PF<sub>6</sub>)<sub>2</sub>] as anolyte and N-hexyl phenothiazine [HPT] as catholyte demonstrated. A cell operated with mixed electrolyte (1:1) containing 0.2 M [BV(PF<sub>6</sub>)<sub>2</sub>] and 0.2 M [HPT] delivered a coulombic efficiency (CE) of 95.3 % and energy efficiency (EE) 53%, with nearly 68.9% material utilisation at 40 mA cm<sup>-2</sup> current density.

**Keywords :** non-aqueous redox flow battery, benzyl viologen, N-hexyl phenothiazine, mixed electrolyte

**Conference Title :** ICBEST 2024 : International Conference on Batteries and Energy Storage Technology

**Conference Location :** London, United Kingdom

**Conference Dates :** January 15-16, 2024