

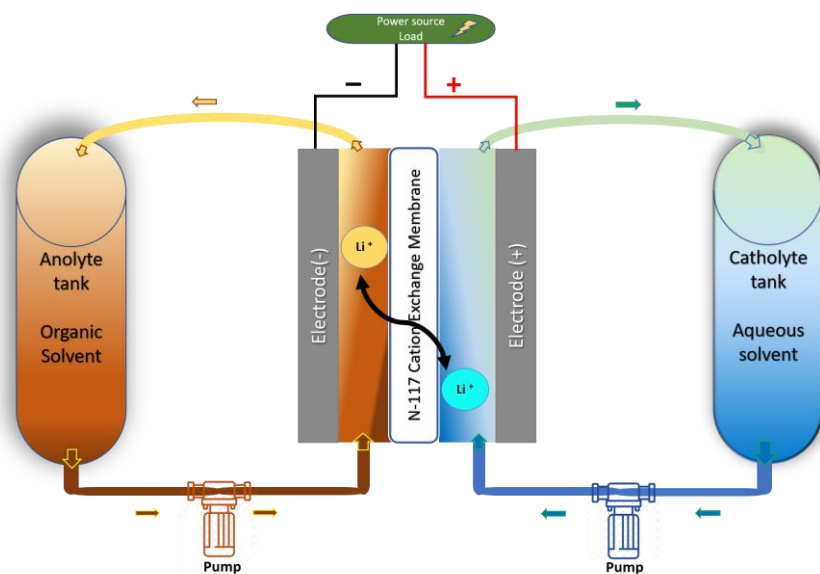
# Boosting the Cell Voltage in Biphasic Flow Batteries Using Galvani Potential Difference

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In conventional flow batteries, the fundamental principle involves the utilization of two redox couples dissolved in solvents, allowing for the storage and release of electrical energy through the process of charge and discharge.<sup>1</sup> However, the evolving energy storage landscape has led to the emergence of biphasic flow batteries, which utilize organic solvents for a higher cell voltage compared to water-based.<sup>2-5</sup> Unlike their monophasic counterparts, biphasic flow batteries introduce a novel approach by employing two immiscible liquid phases (Immiscible Negolyte and Posolyte), often a combination of organic and aqueous phases or more recently also two aqueous containing phases.<sup>6</sup> It is well known since pioneering work of Gavach<sup>7-9</sup> that the interface between certain immiscible solvents can be significantly polarized, resulting in Galvani potential differences of up to 0.7 V between phases. This effect is demonstrated by comparing batteries utilizing three different solvents, trifluorotoluene, dichloroethane and propylene carbonate, with ferrocene and decamethyl ferrocene as model organic redox couples.<sup>10</sup>



**Figure 1:** Scheme of a biphasic flow battery indicating the Galvani potential difference of  $\text{Li}^+$

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## References

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