The Redox-Mediated Nickel–Metal Hydride Flow Battery Enables Decoupling of Energy and Power for a *Traditional* Battery Chemistry

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Each battery technology possesses intrinsic advantages and disadvantages: e.g. Nickel–Metal Hydrides batteries offers relatively high specific energy and power as well as safety, making them the power of choice for hybrid electric vehicles, whereas aqueous organic flow batteries (AORFBs) are featured by sustainability and simple replacement of their active materials, and independent scalability of energy and power, making them very attractive for stationary energy storage.[1]

In this presentation, a new battery technology that merges the abovementioned battery technologies through the use of redox-mediated reactions is described intrinsically possessing the main features of each separate technology; e.g. high energy density of the solid active materials, easy recyclability and independent scalability of energy and power (Figure 1a).[2] To achieve this, $Ni(OH)_2$ and MHs are confined in the positive and negative reservoirs of an AORFB that employs alkaline solutions of potassium ferrocyanide and a mixture of 2,6-dihydroxyanthraquinone and 7,8-dihydroxyphenazine-2-sulfonic acid as catholyte and anolyte, respectively. An energy density of 128 WhL^{-1} is achieved based on the capacity of the reservoirs leaving ample room for improvement up to the theoretical limit of 378 WhL^{-1} (Figure 2b). This new battery technology opens up new market opportunities never-envisioned before for redox flow batteries, e.g. domestic energy storage and heavy-duty vehicles transportation.

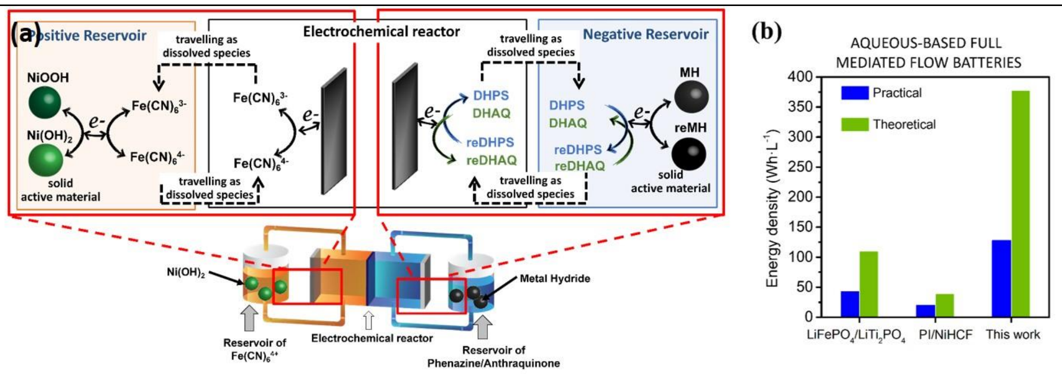

Figure 1 (a) Schematic illustration of the working principle of the proposed redox mediated Ni – MH flow battery in which the dissolved active species in positive (ferrocyanide) and negative compartments (DHPS and DHAQ) not only store energy but also act as redox mediators to enable reversible charge storage in high-energy solid active material boosters ($Ni(OH)_2$ and MHs) confined in the reservoir. **(b)** Representation of the theoretical and achieved energy density for redox-mediated flow batteries.[2]

References

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