

Redox Flow Batteries for Large-Scale off-grid Energy Storage Technologies

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Abstract

In recent years, the interest in sustainable energy storage has increased considerably due to the massive demand for electricity generation. Energy storage devices could provide a temporary medium to store surplus energy so that it can be utilized when needed. For storing such energies, Electrochemical Energy Storage Systems (ESS) such as Li-ion, Na-ion, Zn-ion, and flow batteries are considered a promising candidate due to their long cycle life and high energy density. Various such EES devices have been widely used for the past few decades for different consumer requirements ranging from small to large scale. Among the above technologies, flow batteries have drawn much attention in recent years, especially for large-scale energy storage off-grid applications owing to their decoupling nature of power and energy, ambient temperature operation, long cycle life, low maintenance, appreciable round-trip efficiency, and fast response for large-scale energy storage systems. Therefore, this presentation aims to address the basics of redox flow batteries, our recent activities in electrode modification, electrolyte additives, suppression of ion cross-over through the separator and flow cell design, etc.