

Nanorod Niobium Oxides as Powerful Catalysts for an All Vanadium Redox Flow Battery

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Bin Li, et al. *Nano Letters* 3(2014) 1330.

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Challenges for VRB: **High cost**

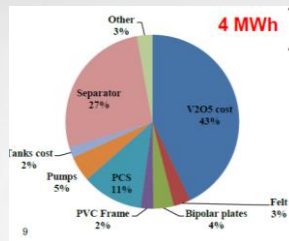
Reducing stack size

Increasing charge/discharge current density

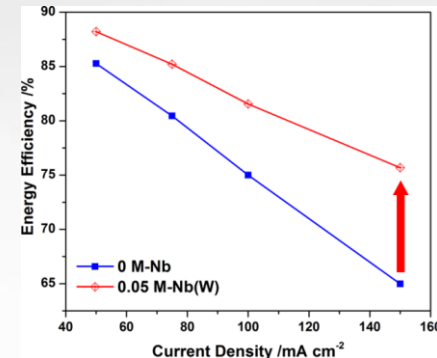
Energy efficiency

Utilization ratio of fuels

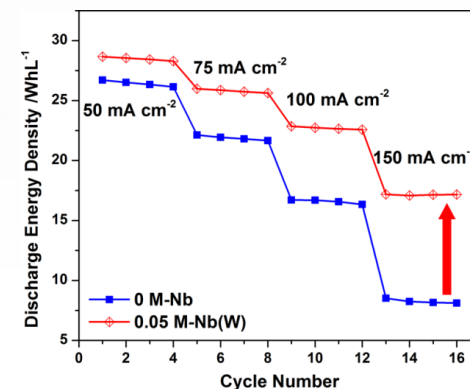
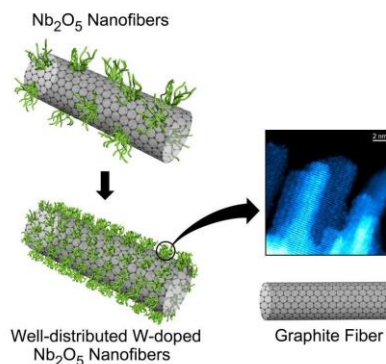
Optimization of carbon electrodes



Viswanathan, Vilayanur, et al. *JPS*(2012).



~11% increase in efficiency



~25% increase in vanadium utilization

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