Chemical and electrochemical properties of a dual electrolyte cell employing a solid electrolyte membrane for large scale energy storage

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Renewable energy sources such as wind and solar energy have an inherent intermittency issue, so combining the renewable energy generation with a large-scale battery system is inevitable to promote a future success of clean energy. Among several energy storage options, the redox flow battery employing lithium metal as an anode is particularly interesting owing to its high energy density.

We have demonstrated the electrochemical properties of redox flow cells with a lithium anode and a commercial Li^+-ion conducting membrane of NASICON structure. [1,2] A stable $Fe(CN)_6^{3-}$ /$Fe(CN)_6^{4-}$ redox couple could bring an acceptable voltage of 3.4 V to the lithium|aqueous-cathode battery.

We will discuss recent observations of the mechanical and chemical properties of lab-made solid electrolyte membranes and the electrochemical properties of a flow-through cell employing the membranes with alternative redox couples.

References

[1] Yuhao Lu, John B. Goodenough, and Youngsik Kim, *J. Am. Chem. Soc*., 2011, 133, 5756–5759.

[2] Yuhao Lu and John B. Goodenough, *J. Mater. Chem*., 2011, 21, 10113–10117.