Advanced Redox Flow Battery R&D at Pacific Northwest National Laboratory

Wei Wang, Qingtao Luo, Zimin Nie, Murugesan Vijayakumar, Xiaoliang Wei, Bin Li, Baowei Chen, Yuyan Shao, Ed Thomsen, David Reed, and Vincent Sprenkle

Pacific Northwest National Laboratory
902 Battelle Boulevard P. O. Box 999, Richland, WA 99354, USA

This presentation describes the recent progress of the advanced redox flow battery research being performed at Pacific Northwest National Laboratory for the U.S. Department of Energy's Energy Storage Systems Program.[1] Recent development on the single cell components including new PTFE/SiO_2 separator (Figure 1),[2] high performance catalyst electrode (Figure 2),[3] and new electrolyte additives will be presented. Varied electrochemical, chemical and physical evaluations were carried out to assist the component screening and optimization. The mass transport mechanisms of the redox flow battery will be discussed, which allowed us to optimize the related cell operation parameters and continuously operate the system for more than three months without any capacity decay.

Reference

[1] W. Wang, Q. Luo, B. Li, X. Wei, L. Li, Z. Yang, Advanced Functional Materials 2013, 23, 970.
[2] X. Wei, Z. Nie, Q. Luo, B. Li, B. Chen, K. Simmons, V. Sprenkle, W. Wang, Advanced Energy Materials 2013, DOI:10.1002/aenm.201201112.
[3] B. Li, M. Gu, Z. Nie, Y. Shao, Q. Luo, X. Wei, X. Li, J. Xiao, C. Wang, V. Sprenkle, W. Wang, Nano Lett 2013, 13, 1330.

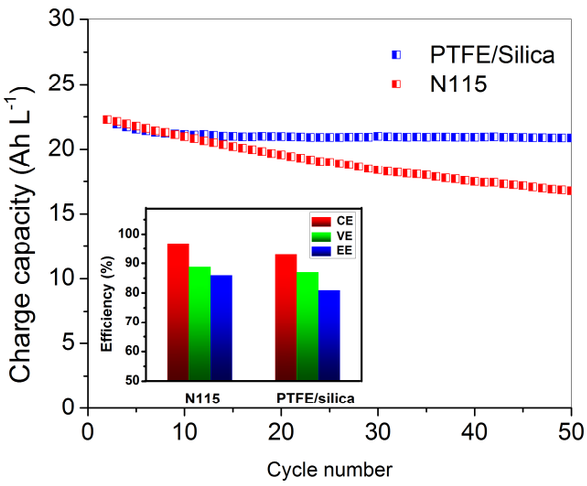

Figure 1. Comparison of VRB performance between N115 and PTFE/Silica separator.

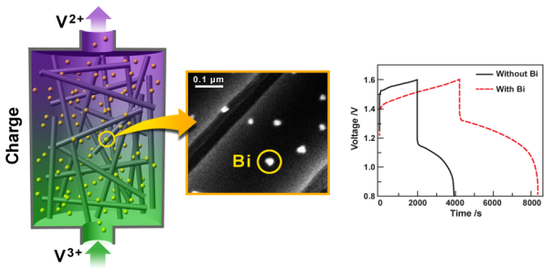

Figure 2. High performance Bismuth nanoparticle decorated graphite felt electrode.