Effect of operating condition on cyclic performance of a hydrogen-bromine flow battery

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To develop a cost-effective electrochemical system for storing grid-scale energy, LBNL has been working on a high-power redox flow battery (RFB) by utilizing hydrogen and bromine as reactants. This system has demonstrated first-in-class RFB performance through cell component and structure optimization recently.[1]

In this study, we report on the cyclic performance of a H_2-Br_2 RFB, and especially the effect of operating conditions such as electrolyte concentration, cut-off potential, and current on the cyclic performance. Various diagnostic methods such as measurement of over-potential with open-circuit-voltage (OCV) monitoring cell and analysis of exit gas from cell with a real time gas analyzer (RTGA) were utilized to find the proper operating conditions to minimize performance loss and side reactions.

Figure 1 shows the effect of current on cyclic performance. It was found that coulombic efficiency increased while capacity and energy efficiency deteriorated with increase of current, showing the complex interplay between efficiency and power. In this talk, the effect of operating conditions will be discussed with analysis results, and key conditions for high cyclic performance will be suggested.

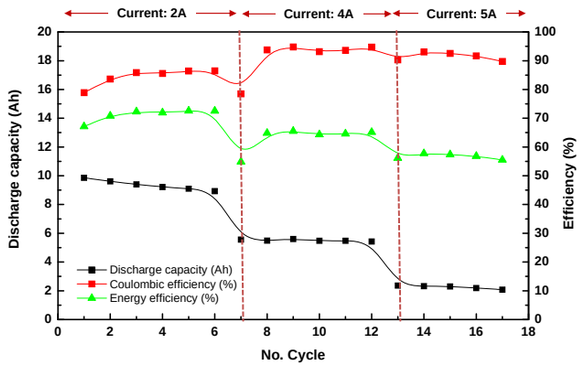

Figure 1. Effect of operating conditions on the cyclic performance.

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References

1. K. T. Cho, P. Ridgway, A. Z. Weber, S. Haussener, V. Battaglia and V. Srinivasan, *J. Electrochem. Soc.*, 2012, **159**, A1806-A1815.