

Supporting information

Solid Bromine Complexing Agents: Long-term Solution for Corrosive Conditions in Redox-Flow Battery

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Flow battery structure:

The MEA was made of two 7 cm² electrodes which were hot pressed to the membrane. The MEA was placed between the channelled graphite plates. Serpentine channel was used for the hydrogen side and interdigitated was used for the bromine side. Two copper plates were used to tight the cell and to serve as current collectors, as shown at figure 1S.



Figure 1S: RFB cell's components: copper plates current collectors and graphite plates with flow channels.

Electrochemical impedance spectroscopy (EIS):

EIS was measured after every charge-discharge cycle. The EIS was measured with 10mV amplitude around the OCV and frequency range from 1Hz to 8kHz. The results are shown in figure 2S and table 1S.

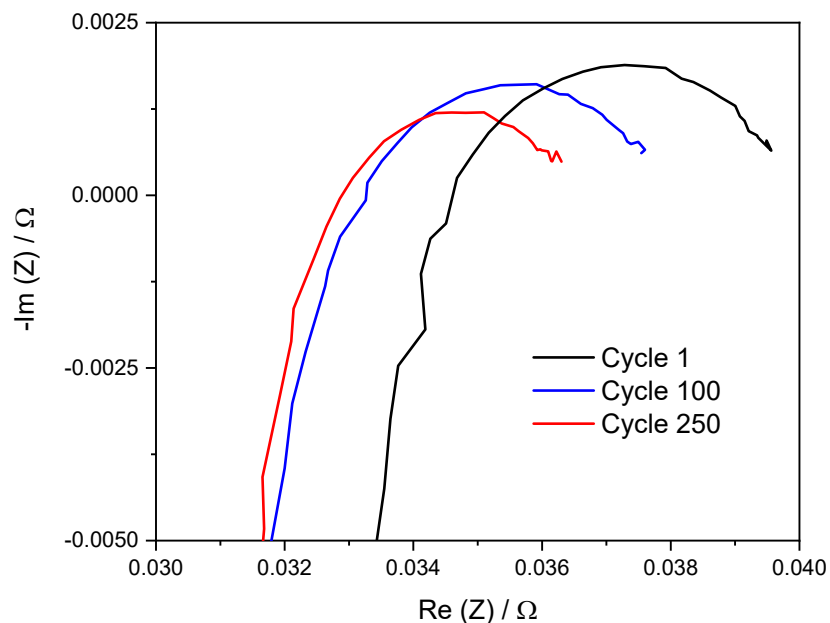


Figure 2S: EIS evolution along cycling.

Cycle	R_s	R_{CT}
1	34.6	5.3
100	33.3	4.6
250	33	3.4

Table 1S: EIS measurements along cycling after SBCA addition to the RFB

The EIS measurement is analyzed by the elliptical fitting approach, by selecting the semicircle points of the Nyquist plot and applying circular fit.¹

SOC	HBr[M]	Br ₂ [M]	BCA[M]	TOC ppm

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100	1.1	3.30	1.1	49
67	3.3	2.20	1.1	32
32	5.5	1.10	1.1	50
16	6.6	0.55	1.1	193
0	7.7	0.00	1.1	125

Table S2: Organic residues contents (TOC) in the electrolyte containing SBCA after 1 year soaking for different states of charge

Efficiencies calculations:

The efficiencies are calculated by the following equations:

$$\text{Eq. (1)} \quad \text{Coulombic Eff.} = (Q_{\text{disch}} / Q_{\text{ch}}) * 100$$

$$\text{Eq. (2)} \quad \text{Energy Eff.} = (E_{\text{disch}} / E_{\text{ch}}) * 100$$

1. Pfeiffer N, Wachter T, Frickel J, Hofmann C, Errachid A, Heuberger A. Elliptical fitting as an alternative approach to complex nonlinear least squares regression for modeling electrochemical impedance spectroscopy. *BIOSIGNALS 2021 - 14th Int Conf Bio-Inspired Syst Signal Process Part 14th Int Jt Conf Biomed Eng Syst Technol BIOSTEC 2021*. 2021;(September):42-49. doi:10.5220/0010231600420049