Review of: "Flow Batteries From 1879 To 2022 And Beyond"

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Potential competing interests: No potential competing interests to declare.

Flow Batteries From 1879 To 2022 And Beyond

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I note that the paper is also published elsewhere (J. Electrochem. Sci. Eng. X (20YY) pp-pp; doi: http://dx.doi.org/10.5599/jese.0000)

The paper presents an overview on flow batteries, partially from and historical point of view and partially from the status of the art side. It is very accurate under some points, less under others. It considers a huge literature, though incomplete because neglects some important aspects of FB systems. This appears surprising, because the paper seems to aim at real grid application, giving attention to efficiency, cost, etc. of FB systems (see highlights in page 1).

From a historical point of few, I would consider the 1879 design by John Doyle a far archetype of a flow battery as we intend now today: in the latter, the presence of pumps and the recharging function are essential.

As regards the status of art, the paper deals in great details the behavior of porous electrodes, but it neglects or overlooks some major issues, e.g. side effects in stacks of several cells with large active areas and different loss terms affecting the efficiency of large flow batteries, which seems to indicate the author has more confidence with small scale single cell experiments than with industrial systems. Information provided at page 12 line 8-10 are partial, in particular shunt currents are totally overlooked, although they can produce losses as high as hydraulic losses. As a suggestion, see “Comparison of energy losses in a 9 kW vanadium redox flow battery”, *Journal of Power Sources*, 440 (2019) 227144. **DOI**: 10.1016/j.jpowsour.2019.227144.

At page 17 line 16-17 long durability is attributed to FBs in general, not only to VFBs. This is inappropriate because some FBs (e.g. organic) have poor durability.

The appendixes on patents and publications provide informative details (lens).

Here is a short list present just few among many flaws and typos.

Pg 1	Highlights	Ω/cm^2	→	$\Omega\ cm^2$
2	Notations and abbr	$\Omega hm\ cm^2$	-Z	$ohm\ cm^2$
2	“	$C_o=C(1+f)/2$	→	at f=0 yields $C_o=C/2$; is this correct?

2	“	$C_1=C(1+f)/2$	→	at f=0 yields $C_1=C/2$; is this correct?
3	“	kg/ms^2	→	kg/m^2
3	“	an negode	→	a negode
4	fig 1	missing in the downloaded pdf		
8 line 1-3	Zinc-iodine battery	same comment is needed		
9 line 10 fb		$\Omega\ cm^{-2}$	→	$\Omega\ cm^2$
12 line 16	d	→	*d_*	

Some references (e.g. 454) are badly cited.